



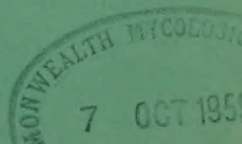
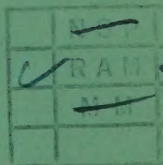
UGANDA PROTECTORATE

**Annual Report
of the
Department of Agriculture**

For the Year Ended 31st December, 1958

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DEPARTMENT OF AGRICULTURE

Annual Report

For the year ended 31st December, 1958

I. INTRODUCTION

(a) Policy

1. In order that progress during the year may be reviewed against the background of official policy a summary of the main aims of the Department is given below:—

(i) to ensure that the cultivators produce sufficient food for themselves, and for the consuming public, of a type and quality to meet their dietetic needs;

(ii) to seek new knowledge by means of co-ordinated research designed to improve land usage and the yields and quality of both crops and livestock;

(iii) to ensure that the land is properly used and the soil conserved;

(iv) to encourage the maximum production of economic crops for export or for local use; while fulfilling policy aims (i) and (iii);

(v) to ensure that the primary marketing of all economic crops and the further marketing of those economic crops which are not handled by statutory boards are carried out as efficiently as possible;

(vi) to introduce improved farming systems which, where appropriate, integrate stock and crops to their mutual advantage;

(vii) to disseminate proven agricultural knowledge by all means available, but particularly through agricultural teaching institutions and the activities of departmental field staff.

(b) General Review

2. The production drive was intensified, particular emphasis being placed on immediate increase in the output of cotton and coffee. Owing to the more competitive state of world markets, close attention was paid to the quality of export crops.

3. After a late break of the spring rains the weather was favourable during the main planting and growing seasons, but prolonged dry weather in the third quarter lowered crop yields.

4. There was a poor carry-over of food from 1957 and this, together with the delayed rains, resulted in severe local food shortages early in the year in the Northern and Eastern provinces. Minor shortages were experienced in the Western Province around the middle of the year. A successful campaign to encourage early planting of food crops, coupled with the establishment of large acreages of root crops in the second rains, relieved anxieties about the future.

5. The 1957/58 cotton crop amounted to only 350,974 bales owing to the prolonged period of poor rains in the second and third quarters of 1957. In the current season, as a result of the successful early planting campaign, over one million acres were planted by the end of June and the total acreage sown was the highest on record. Dry weather at the critical flowering period, in October and November, destroyed earlier hopes of a record production. The pedigree seed increase schemes continued according to plan and the old B.P.52 variety was completely replaced by new multi-line strains, whilst the improved strains of S.47 were planted in the Teso and Mbale zones. Spraying against *Lygus* and other pests passed to the extension stage and 6,000 acres were sprayed by farmers themselves with promising results. All cotton seed for planting was dressed against blackarm disease.

6. The production of African-grown coffee, other than Bugisu Arabica, continued to expand, the 1958 crop being the highest ever. Following on the report of the Commission of Enquiry appointed to enquire into the activities of the Bugisu Co-operative Union, proposals for re-organising the Bugisu Coffee Industry, with special reference to improving quality, were published by Government. In the Western Province, successful large-scale spraying trials carried out against the *Antestia* bug on Arabica coffee brought about a revival of interest in the crop.

7. Record crops of fire- and flue-cured tobacco leaf were grown and the production of all types of leaf satisfied local manufacturing requirements. A quest for overseas markets for leaf began. Both sugar and tea production again increased, surpassing the record crops of 1957. Cocoa was planted by African farmers in Buganda for the first time.

8. At Bukalasa Farm Institute the first group of students successfully completed the two years' course in basic agriculture and arrangements were made to start the third year's course of specialist departmental training in 1959. Arapai Farm Institute opened its doors in February and had a successful first year.

9. All departmental field staff devoted more time than ever to the campaign to raise production, but there was no slackening of diligence in conserving the fertility of the soil.

10. The response of farmers to the newly-formed farm planning service continued to be most favourable. Expansion was restrained firstly by the policy not to advocate new methods or ventures until their economic advantage was reasonably assured and secondly by the amount of work which available staff could undertake.

11. Excellent progress was made with mapping the soils and vegetation of the whole Protectorate, both in the field and in the laboratory.

II. WEATHER

12. After a late break of the main rains, the rainfall pattern, with local exceptions, was generally favourable until the last quarter, when a period of drought dashed hopes of a bumper cotton crop and reduced the yields of all second rains plantings. The normal June/July break in the rains was shorter than usual and December was exceptionally wet.

13. The dry season was more than usually severe, particularly in Buganda, although some heavy localised rain was received in the Eastern Province in the first half of February and in early March. The weather became increasingly unsettled from mid-March onwards, but rain did not become general until the middle of April. The wet weather continued until the second week of May, when rainfall became generally lighter and there were dry spells in many parts of the Protectorate. There was adequate rain in Buganda during June, but elsewhere the month was mainly dry, with the exception of the Northern Province, where there were some fairly heavy storms during the last week. The second rains began during the second week of July, after which rainfall was plentiful and well-distributed until mid-October, particularly in the Northern Province. In the extreme south of the Protectorate, however, the third quarter was mainly dry. Only local showers fell in the second half of October, and November was exceptionally dry. During the second week of December, the dry weather was broken by unseasonable rains, which persisted in most areas until late in the month.

III. FOOD CROPS AND FOOD SUPPLIES

14. The poor rains in the second half of 1957 led to a reduction in food reserves and severe local shortages occurred in parts of the Eastern and Northern provinces before the 1958 harvests were gathered. A campaign was launched for early planting of food crops and, assisted by favourable weather, this restored the position.

15. In the Northern and Eastern provinces the food shortages which occurred in the first half of the year were made good by the purchase of food from more favoured areas in the districts concerned and sales of maize meal

through trade channels. In one small area of Bugisu, however, limited issues of maize were made. In the Northern Province the most severely affected areas were the southern lowlands of West Nile District and the east of Acholi District. In Buganda Province there were seasonal shortages of plantains, but other foods were consumed in their stead. Apart from some local shortages in parts of Kigezi and Ankole districts during June and July, the supply of foodstuffs in the Western Province was adequate throughout the year.

16. There was more extensive planting of cassava varieties resistant to mosaic disease, particularly in the Eastern and Northern provinces. The newly discovered technique for controlling Banana Weevil by applications of dieldrin was not employed by farmers in Buganda on the wide scale that the situation warranted.

17. Growers responded well to the drive to encourage early planting of food crops in the Eastern and Northern provinces. The main finger millet harvest in the Northern Province was smaller than usual owing to the late break in the main rains and to dry spells in May and June; reserves were restored by large acreages of root crops planted during the second rains. In the Eastern Province food crops yielded satisfactorily both in the grain and plantain growing areas. Spring-sown crops in the Western Province gave light yields in many parts, but the second rains plantings yielded satisfactorily in Buganda and adequate acreages of all the main food crops were planted. At the close of the year food supplies were sufficient in all parts of the Protectorate, excepting the southern lowlands of West Nile and in parts of the Eastern Province where local shortages may develop in the first half of 1959.

IV. ECONOMIC CROPS

(a) Cotton

(i) 1957/58 Season

18. As the crop year is from 1st May to 30th April, this report deals only with the marketing of the 1957/58 crop.

19. The hot, dry weather in the main cotton growing areas during January and February assisted the harvest and marketing proceeded smoothly. Some deterioration of grade occurred because of heavy rain during March, but on the whole a satisfactory standard was maintained. The total output was 350,974 bales, which was approximately 21,000 bales less than in the previous season. Whilst this was disappointing, after the early high promise of the crop, but for the greater proportion of early cotton, production might well have been very small indeed instead of slightly below average. The following table gives comparative figures of production over the last twelve seasons:

Table A.—Cotton Production 1946/47–1957/58

Season	Estimated acreage	Bales of lint (400 lb.)	Average yield of seed cotton per acre	Average price to growers (100 lb. seed cotton)
			<i>lb.</i>	<i>Shs. cts.</i>
1946–47 ..	1,253,257	231,745	247	18 45
1947–48 ..	1,036,829	170,066	218	20 42
1948–49 ..	1,555,371	391,240	333	29 61
1949–50 ..	1,628,473	339,788	282	31 75
1950–51 ..	1,535,200	346,465	301	43 16
1951–52 ..	1,514,157	380,304	332	47 56
1952–53 ..	1,472,553	319,992	290	48 60
1953–54 ..	1,611,223	397,631	325	49 40
1954–55 ..	1,738,821	299,935	227	58 81
1955–56 ..	1,585,500	363,449	305	52 11
1956–57 ..	1,568,539	372,433	313	53 34
1957–58 ..	1,617,013	350,974	288	54 90

NOTE.—The average production for the ten-year period 1948/49–1957/58 inclusive was 45,000 bales greater than during any previous ten-year period.

20. Prices paid for clean raw cotton were 58 and 57 cents per lb. for B.P.52 and S.47 varieties respectively. Stained raw cotton was priced at 22 cents per lb. in all areas, except in the West Nile Zone, where the price was 25 cents per lb. It is estimated that the total receipts from the sale of the crop were £12,792,350.

21. The number of ginneries operating was 130, of which 11 (three in Buganda, six in the Eastern Province, one in the Western Province and one in the Northern Province) were operated by African growers' co-operative unions; the remainder were mainly in Asian ownership. The Lint Marketing Board bought all lint cotton from ginneries at prices based on the statutory fixed prices for raw cotton and on negotiated buying and ginning costs, with allowance for profit. The whole crop was sold on the Kampala auctions, together with AR cotton seed not required for planting.

(ii) 1958/59 Season

22. The season was noteworthy for the success of the early planting campaign. Farmers generally accepted the Department's advice to plant early and, coupled with favourable weather, this resulted in over a million acres being planted by the end of June. Sowing continued apace in July and August and the final estimated acreage of 2,014,020 is the highest ever recorded in the Protectorate. The crop made excellent progress until dearth of rain from the middle of October until early December drastically limited the capacity of the crop to yield, particularly in the case of the later sowings. Subsequently the wet weather in December further reduced prospects through losses in the field where picking was neglected. Marketing started in November and by the end of the year 97,594 bales had been bought. At the close of the year a record crop was predicted but this forecast was reduced later to 410,000 bales.

(iii) *Multiplication of New Strains of Cotton*

23. Pedigree seed increase in both the B.P.52 and S.47 areas continued according to plan. During 1958 new multi-line strains of B.P.52, bred at the Cotton Research Station of the Empire Cotton Growing Corporation, at Namulonge, were planted throughout the B.P.52 areas, whilst in the S.47 areas the improved strains bred at Serere Experiment Station were planted in the Teso and Mbale Zones. Under the two schemes, the seed in each zone in the Protectorate is replaced by successive annual waves of pedigree seed emanating from Namulonge or Serere. Towards the end of the year arrangements were made to extend the B.P.52 area to the West Nile and Busoga Zones.

(iv) *Cotton Spraying*

24. Following successful spraying trials against *Lygus* and other pests carried out in 1957, approximately 6,000 acres were sprayed by farmers themselves in 1958. At the end of the year there were striking differences between sprayed and unsprayed plots and economic yield increases are expected. Farmers generally are most impressed by the efficacy of D.D.T. spraying and a large increase in the area treated, particularly in the Eastern and Northern provinces, is likely in 1959.

(b) *Coffee*

(i) *Bugisu Arabica—1957/58 Season*

25. Total production amounted to 4,805 tons of parchment and 184 tons of "buni". The whole crop was prepared by growers themselves using hand pulpers. Collection and export to the Nairobi mills and auctions were the responsibility of the Bugisu Co-operative Union. Careless production and preparation, combined with lenient grading by primary societies, resulted in a serious deterioration in quality: the average classification for the season was 5.6 compared with 4.9 in 1956/57 and 4.7 in 1955/56. The average prices per pound paid to primary societies by the Co-operative Union were:

		Shs.	Cts.
No. 1 Parchment	...	2	30
No. 2 Parchment	...	1	00
"Buni"	...	0	50

26. The whole crop was milled and auctioned in Nairobi. The average prices realised per cwt. for clean coffee compared with those obtained in the 1956/57 season were:

		1957/58	1956/57
		Shs.	Shs.
No. 1	...	387/-	493/40
No. 2	...	322/-	407/22
"Buni"	...	256/-	287/17

27. The price for clean coffee obtained from No. 1 parchment decreased by over £100 per ton. This was partly due to the lower prices prevailing on world markets, but the fall in value was mainly attributable to the serious deterioration in quality.

(ii) *Commission of Enquiry*

28. The Commission of Enquiry appointed in March 1958 by the Commissioner for Co-operative Development to enquire into the affairs of the Bugisu Co-operative Union drew attention to the serious decline in the quality of Bugisu coffee and made recommendations to Government. Arising from these recommendations, Government announced its proposals for the future organisation of the Bugisu Coffee Industry in Sessional Paper No. 19 of 1958. The main proposals, affecting the agricultural side of the Industry, were:—

(1) It must continue to be the aim to produce a high quality washed coffee which can compete on equal terms with first quality grades from other Arabica coffee producing countries.

(2) Pulperies for primary societies will be established to operate under the supervision of the Agricultural Department.

(3) The siting of pulperies will be decided by the Agricultural Department in consultation with the primary society concerned and the Union.

(4) Individual societies unwilling to take their cherry to pulperies may continue to pulp it by hand and deliver it as parchment to the Union, who will market it separately and pay the primary society according to the prices realised on the auction floor.

(5) The Agricultural Department will assume responsibility, hitherto vested in the Bugisu Coffee Board, for promoting and improving coffee cultivation in Bugisu District.

(6) Seasonal fixed prices will be declared for cherry, parchment and “buni” coffee. Any deficit arising from setting the fixed prices too high will be made good from the Price Assistance Fund, established from the capital funds of the Bugisu Coffee Board.

(7) If and when the Price Assistance Fund is liquidated prices to growers can no longer be guaranteed.

(iii) *Bugisu Arabica—1958/59 Season*

29. Apart from a dry spell in May, rainfall was generally adequate for the crop at all altitudes. Flowering started at the lower altitudes in January and spread gradually to the higher altitudes where the main flowering ended in May. Pruning was again done by trained gangs paid by the Co-operative Union. The standard of work was satisfactory but charges rose to Shs. 31/- per acre compared with Shs. 26/- in the previous season. Seedling production was in the hands of individual societies, 81

nurseries being maintained with funds supplied by the Union. The total number of seedlings distributed was 2,653,440 and it was estimated that losses amounted to 11 per cent compared with 7 per cent in 1957/58. The increased loss of seedlings in the field is attributed to the dry weather which followed immediately after distribution. It is estimated that 1,968 acres were planted, bringing the total area of coffee to 23,900 acres, of which 17,820 acres were in bearing. Although a satisfactory crop was set and the general standard of cultivation showed an improvement over that of the previous season the exceptionally high incidence of berry borer, *Antestia* and lace bug greatly reduced the prospects of obtaining a good crop. Picking of the main crop started at the lower altitudes in June. Owing to pre-occupation with circumcision ceremonies much of the crop was allowed to become over-ripe before picking, and quality suffered.

30. In accordance with the declared policy to raise quality standards, three pulperies formerly operated under the Bugisu Coffee Scheme were restored and were operated under the supervision of the Department. In addition, selected growers were encouraged to produce a special grade. Liquoring tests carried out so far have classified the selected farmers' parchment as class 3, central pulpery parchment as class 4, and No. 1 Bugisu parchment as class 6. Prices per pound paid to growers for the various grades were:—

	<i>Shs. Cts.</i>
Cherry (for preparation of central pulpery parchment)	0 25
Selected farmers' parchment	1 25*
Bugisu No. I parchment	1 25
Bugisu No. II parchment	0 75
Bugisu No. III parchment	0 25
"Buni"	0 50

31. By the end of the year the following tonnages of parchment had been collected by the Union:

	<i>Tons</i>
Central pulpery parchment ...	75
Selected farmers' parchment	40
Bugisu parchment—all grades	3,568
	3,683

32. A total crop for the 1958/59 season of 4,500 tons of parchment is expected. Details of the crops produced in the last twelve seasons are shown in the following table:—

*With a possibility of a bonus payment if justified by auction floor prices.

Table B.—Bugisu Arabica Coffee

Season	Production (parchment)	Estimated value to growers
	<i>Tons</i>	<i>£</i>
1946-47 ..	3,058	107,215
1947-48 ..	2,996	121,692
1948-49 ..	2,857	173,799
1949-50 ..	2,852	184,859
1950-51 ..	3,896	442,104
1951-52 ..	2,203	377,575
1952-53 ..	2,307	633,040
1953-54 ..	3,122	1,231,791
1954-55 ..	6,170	2,015,662
1955-56 ..	4,098	1,349,576*
1956-57 ..	5,175	1,420,353
1957-58 ..	4,805	1,198,602

*Includes value of 177 tons "buni".

(iv) *African Grown Coffee, Other than Bugisu Arabica*

33. The total production of African grown coffee, other than that grown in Bugisu District was 65,292 tons of clean coffee, which was mainly Robusta, but included 1,373 tons of Arabica grown in Buganda, and the Northern and Western provinces. The record crop of 1957 was thus surpassed by 3,700 tons of clean coffee. Prices paid to growers at curing works remained unchanged throughout the year and were as follows:

	<i>Shs.</i>	<i>Cts.</i>
Robusta unhulled (Kiboko) ...	0	80
Arabica unhulled (Kiboko) ...	1	05
Robusta rough-hulled containing not more than 2 per cent of husk and/or extraneous matter ...	1	50 (minimum price)
Arabica rough-hulled containing not more than 2 per cent of husk and/or extraneous matter ...	2	00 (minimum price)

It is estimated that the value of the crop to the producers was £10½ million.

34. The processing of the crop was done by 12 curing works and seven licensed hulleries in Mengo and Masaka districts. Six of the curing works were African-owned enterprises established under the provisions of the Coffee Industry Ordinance, 1953, and all worked in 1958. Six "associations of growers" and one registered co-operative were granted licences to operate estate coffee factories in accordance with the amending legislation to the Coffee Industry Ordinance, published in 1957. The total acreage of bearing coffee claimed by members of these groups was 33,556.

35. The marketing of clean coffee (other than that produced by African estate coffee factories) remained the responsibility of the Coffee Industry Board. The whole crop was sold on the Kampala auctions. The

market remained fairly steady until early October when there was a general fall in prices. The range in prices during the year in pounds sterling per ton was as follows:—

<i>Grade 10</i>	<i>Grade 15</i>	<i>Grade 25</i>
190½–312	185–311	160–286¾

African estate coffee factories exported 2,304 tons of clean coffee during the year.

36. In Buganda, which is by far the largest producing area, great efforts were made to raise the standards of husbandry, picking and preparation of the crop. There was an encouraging increase in the acreage of coffee mulched with coffee husks from curing works, whilst a considerable number of coffee drying trays were purchased by farmers. The demand for coffee seedlings by far exceeded the supply, despite the large numbers produced privately. A total of 491,450 seedlings were distributed from official nurseries. Pruning and suckering remained backward. Very heavy flowering took place in the last quarter of the year and there were prospects of a large crop in 1959.

37. Successful spraying campaigns against *Antestia* on Arabica coffee brought about a revival of interest in the crop in Ankole and Toro districts. In the latter district there was a marked improvement in the amount of mulching carried out, particularly in Bwamba County, which is the main producing area. Production in this county amounted to the equivalent of 797 tons of clean Robusta and 107 tons of clean Arabica. Total production in Toro District was 201 tons of clean Arabica and 806 tons of clean Robusta. Closer supervision of marketing in Ankole District enabled more accurate figures of production to be obtained. Sales during the year expressed as clean coffee were 1,662 tons of Robusta and 526 tons of Arabica. The number of nurseries in Kigezi District was increased to 40 of which two are for the production of Robusta seedlings. It is planned to establish 16,000 acres of Arabica by 1960. The 1958 crop was estimated at 13 tons of clean Arabica and 32 tons of clean Robusta. Keen interest was maintained in Robusta coffee in Bunyoro District and the area under nurseries was extended. Production amounted to 54 tons (clean).

38. In the Eastern Province Robusta coffee is grown in Busoga and Bukedi districts. Seedlings issues during the year in Busoga totalled 65,000. Growers in Bukedi were encouraged to plant their coffee in small plots near homesteads and 10,000 seedlings were sold. Production in Busoga was estimated at 315 tons (clean) compared with 334 tons in 1957.

39. Sales from the 1957/58 crop in West Nile amounted to approximately 15 tons of clean Arabica and a little under half a ton of clean Robusta. A special drive was initiated to improve standards of husbandry and many field demonstrations were held. In addition, a number of pruning teams were trained.

40. Details of total production during the last eleven years are as follows:—

Table C.—African Coffee Production
(other than Bugisu Coffee)

	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
Cured coffee (tons) ..	31,142	18,351	26,263	34,362	29,563	26,998	25,196	60,160	48,498	61,570	65,292

(v) Estate Coffee Production

41. Production during the 1957/58 season was a record, 12,543 tons of clean Robusta and 543 tons of clean Arabica being produced. Most of the crop was sold on the Mombasa auctions, prices averaging £255 for Robusta and £300 for Arabica.

42. The following table shows quantities and estimated values of the coffee sold by estates during the last eleven seasons:

Table D.—Estate Coffee Production (Robusta)

Season		Production	Gross Value
		Tons	£
1947-48	..	3,592	281,678
1948-49	..	2,581	227,247
1949-50	..	3,060	616,363
1950-51	..	3,846	940,504
1951-52	..	4,851	1,425,669
1952-53	..	5,921	1,846,697
1953-54	..	5,277	2,100,993
1954-55	..	7,730	1,944,790
1955-56	..	8,941	2,235,250
1956-57	..	11,010	2,857,350
1957-58	..	12,543	3,198,465

(c) Tobacco

(i) Flue-cured

43. Production of this type of leaf is confined to the West Nile, Acholi and Lango districts in the Northern Province and Kigezi District in the Western Province. The variety grown is Harrison's Special.

44. Sowing of nursery beds began in January in West Nile District and transplanting started in late March. The total acreage planted for green leaf production was 2,102 acres, whilst Olili and Otrevu co-operatives grew 74 acres for curing in their own barns. Purchases of green leaf by the East African Tobacco Company amounted to 8,416,699 lb. from which 830,257 lb. of cured leaf were produced. The exceptionally high green to cured leaf ratio (10:14 : 1) was due to the prolonged wet weather and lack of sunshine during the main growing period. The wet conditions also

favoured the spread of frog eye disease which lowered grade considerably. The average yield per acre was 395 lb. of cured leaf. Green leaf was bought in all districts in three grades at 12, eight and three cents per lb.

45. The planting programme in Acholi District followed the same pattern as in West Nile, 1,124 acres being planted for green leaf production for sale to the East African Tobacco Company, whilst farmers doing their own curing planted a further 171 acres. Good stands were established, but the prolonged wet weather and frequent cloudy conditions resulted in an exceptionally heavy attack of frog eye disease. As in West Nile the curing out-turn was poor, 385,048 lb. of leaf being cured from a total of 3,690,486 lb. of green leaf. This crop was the largest ever produced in the district. Independent growers produced 51,854 lb. of cured leaf, which is approximately the same amount as they sold in 1957. Farmers curing their own leaf numbered seven.

46. In Lango District, members of the Ngai Group Farm, who were the sole producers of tobacco in the district, planted eleven acres, from which they sold 2,609 lb. of graded cured leaf to the East African Tobacco Company.

47. In Kigezi District, marketing of the 1957 autumn crop was completed in January, the total production being 70,000 lb. of cured leaf. The approximate green to cured leaf ratio was 8 : 1. Quality was impaired by the tendency of growers to pick immature leaf. Sowing of the 1958 spring crop started in February and transplanting took place in March and April, a total of 253 acres being established under favourable conditions. Sales of green leaf amounted to 496,000 lb. from which 62,000 lb. of cured leaf were obtained. Dry weather during the third quarter delayed the planting of the autumn crop which was estimated at 264 acres. Picking started in December and quality of leaf offered for sale was good.

48. Full details of production in all districts during 1958 compared with that of the previous year are given below :—

Table E.—Flue-cured Tobacco Production

AREA	ACREAGE		PRODUCTION (green leaf)		PRODUCTION* (cured leaf)	
	1957	1958	1957	1958	1957	1958
West Nile ..	2,181	2,176	<i>Tons</i> 2,882	<i>Tons</i> 3,757	<i>Tons</i> 10	<i>Tons</i> 7
Acholi ..	1,041	1,295	1,130	1,648	23	23
Lango ..	7	11	—	—	1	1
Kigezi ..	543	517	578†	501‡	—	—
TOTAL ..	3,772	3,999	4,590	5,906	34	31

* Cured by individual farmers and co-operatives.

† 1956 autumn and 1957 spring crops.

‡ 1957 autumn and 1958 spring crops.

(ii) *Air-cured*

49. This crop is grown in West Nile and Mubende districts. Heavy Western is the only variety planted.

50. Transplanting started in West Nile District during April and the good rains during that month enabled excellent stands to be obtained. The total acreage planted was 1,415 compared with 1,078 acres in 1957. During the main growing season the weather was mainly favourable, although at times conditions were too wet. Buying started on 6th October and was completed on 19th December. Sales totalled 968,936 lb. of cured leaf which was the largest crop so far grown in the district. Difficulty was experienced during marketing owing to the high moisture content of leaf offered for sale. Prices paid were Shs. 1/20 and 80 cents for Grades I and II respectively. In Mubende District there was a further fall in the acreage planted as farmers preferred to grow fire-cured leaf; the area planted was 231 acres compared with 440 in 1957 and 585 in 1956. Total production was 109,760 lb. of cured leaf compared with 251,712 lb. in 1957.

51. Details of production during the last two years are given below :—

Table F.—Air-cured Tobacco Production

AREA	ACREAGE		PRODUCTION (cured leaf)	
	1957	1958	1957	1958
West Nile ..	1,078	1,415	<i>Tons</i> 257	<i>Tons</i> 433
Mubende ..	440	231	112	49
TOTAL ..	1,518	1,646	369	482

(iii) *Fire-cured*

52. Preparation of nurseries was carried out early in Bunyoro and although very dry weather in February made some re-sowing necessary, an ample supply of seedlings was produced, except in localised areas where eelworm attack was severe. By and large farmers paid better attention to cultural operations and curing than in previous years. Although the main rains were rather later than usual, they were adequate and well-distributed. Total acreage planted was 5,975, compared with 5,044 acres in 1957. Marketing started on 6th October and was finished in early December, the total crop being 2,857,610 lb. of cured leaf, which is the largest grown since 1943. The average yield per acre was 478 lb. of cured leaf and the quality of the leaf was better than that of the previous season.

53. It was estimated that 1,665 acres were planted in Mubende District compared with 931 in 1957, the entire crop being planted during the second quarter of the year. Some loss was caused by hailstorms, but generally weather was favourable during the growing season. The crop

was 788,811 lb. of cured leaf compared with 615,186 lb. in 1957. In both Bunyoro and Mubende districts the prices paid were Shs. 1/20 and 80 cents for Grades I and II respectively.

54. Details of production in the last two years in both districts are given below:—

Table G.—Fire-cured Tobacco Production

AREA	ACREAGE		PRODUCTION (cured leaf)	
	1957	1958	1957	1958
Bunyoro ..	5,044	5,975	<i>Tons</i> 1,180	<i>Tons</i> 1,275
Mubende ..	931	1,665	275	355
TOTAL ..	5,975	7,640	1,455	1,630

(iv) Development of Overseas Markets

55. With a view to seeking overseas markets for all types of leaf surplus to local manufacturing requirements, arrangements were made for two representatives of a well-known firm of London tobacco leaf brokers to tour the main tobacco growing areas during November, to make an assessment of the export potential of Uganda leaf. The representatives of this firm were hopeful of finding export markets for air- and fire-cured leaf, but stressed the overriding need to improve grade and to lower the moisture content of leaf sold at primary markets. Particular attention was drawn to the need to improve handling at all stages, subsequent to curing, up to the time the leaf reaches the conditioning plant. Little prospect could be seen of securing overseas markets in the near future for Uganda flue-cured leaf. Ways and means of implementing the proposals made in the report are at present being examined by Government.

(d) Oil Seeds

56. Production of seed from the 1957/58 cotton crop was 128,414 tons, of which 105,111 tons were sold (at an average price of Shs. 320 per ton) mainly to local oil millers. Planting accounted for 19,711 tons and the balance of 3,592 tons remained on hand at the end of the year.

57. Sales of groundnuts in the Eastern Province were estimated at 16,300 tons of shelled nuts compared with 13,700 in 1957. Statutory control is not exercised in the marketing of this crop and precise figures of the amounts sold are not available. Prices fluctuated greatly but on average were of the order of 15 cents per lb. unshelled.

58. Sales of sunflower seed in West Nile District amounted to 193 tons, for which growers received an average price of 16 cents per lb.

(e) Maize

59. The poor prices paid during 1957 resulted in reduced planting of this crop in the main producing areas. In Buganda it was estimated that 97,278 acres were planted compared with 138,781 in 1957 and 211,487 in 1956. In consequence, the marketable surplus was much less than usual, it being estimated that only 20,000 tons were sold; but in the absence of any statutory obligations on buyers to submit returns, there is no means of knowing precisely what quantities were sold.

(f) Tea

60. At the end of 1957 the total area of planted tea was 13,061 acres. During 1958 the net increase in licensed acreage was 1,485, bringing the total area licensed at the end of the year to 26,808 acres. Production amounted to 8,266,965 lb. of made tea compared with 8,025,615 lb. in 1957 and was the highest on record.

(g) Sugar

61. A total of 19,889 acres of mature cane was harvested and sugar production from the two estates amounted to 80,889 tons compared with the record production of 80,774 tons in 1957. Exports to Kenya and Tanganyika were 23,060 tons compared with 22,844 tons in 1957.

(h) Sisal

62. Exports of sisal from the one estate near Masindi in the Western Province were 394 tons compared with 361 in 1957.

(i) Cocoa

63. In the spring rains of 1958 seedlings sufficient to plant 15 acres were issued to selected growers in the more fertile parts of Buganda Province. The scatter of plantings is so designed as to provide units of five acres, each of which will be served by a central fermentary. Provided the initial plantings show promise, it is intended to plant one hundred acres in 1959 and to increase the area under the crop to one thousand acres by the 1963 season.

V. AGRICULTURAL DEVELOPMENT AND EXTENSION WORK

(a) Soil Conservation

64. The field staff of the Department continued to encourage the proper protection of both arable and grazing land by extension propaganda. The main measures advocated were grass wash-stops, paspalum bunding, protection of roads and paths, grassing of house compounds, closing of

cattle tracks and over-grazed areas, and mulching of perennial crops such as coffee and bananas. The method of protection varied with locality, grass wash-stops being commonly used in the Northern and Eastern provinces, whilst tied bunds planted with paspalum grass were in general use in Buganda. As in the past, progress made during the year was unspectacular but steady, and looking back over the last few years, it is apparent that very real advances have been made in soil conservation, particularly in densely populated areas.

65. Annual agricultural competitions between administrative units were held in all provinces. In each competition a substantial proportion of marks was awarded for all aspects of soil conservation. The healthy spirit of rivalry created by the competitions did much to stimulate communal effort; the progress made varied considerably, depending mainly on the interest shown by chiefs. Many of the competitions were judged by senior members of the Department and the standard achieved by the winners was very encouraging. In Acholi and Lango districts of the Northern Province, it is now the almost universal practice to leave uncultivated grass strips when opening land and to maintain them throughout the arable rotation. In the West Nile good progress with conservation measures, on cultivated land, was reported from the highlands of the district. In the Western Province uncontrolled burning in the pastoral areas, particularly in Ankole District, continued to cause concern because of the deterioration of the grass cover where the cattle population is high. A bye-law for the control of grass-burning was under consideration in Ankole District at the end of the year. In Kigezi District the high standard of soil protection was well-maintained and improvements were made in the re-alignment and continuity of bunds and, where practicable, dry stone-bunds or walls were built. In Buganda Province progress was variable, depending upon the interest shown by chiefs, but many miles of bunds planted with paspalum were built. In the Eastern Province soil conservation work was kept at a high standard in Teso District, whilst in Bukedi District further progress was made in retaining grass wash-stops throughout the rotation and in the closing of over-grazed areas. In Busoga District the use of paspalum bunds in coffee and bananas spread amongst the more progressive farmers.

(b) Agricultural Education

(i) *Main Farm Institutes*

66. The two main farm institutes at Bukalasa and Arapai look back on a successful year's work and development. Bukalasa, by virtue of its earlier start, made more spectacular progress than Arapai, although at the latter institute much credit is due to the principal and his staff for dealing with the inevitable teething troubles associated with starting a teaching institution from virgin Africa. At Bukalasa, 1958 saw the official opening of the institute by His Excellency the Governor, the passing out of the first

group of students and the rapid development of the institute farm and grounds. There was also a very satisfactory increase in activities outside the academic curriculum and in the development of a corporate life at the institute.

67. The second academic year started at Bukalasa in February with 45 new entrants, of whom six were holders of the Cambridge Overseas School Certificate, whilst the remainder were in possession of the minimum qualification of the Junior Secondary Leaving Certificate. Second-year students numbered 47, of whom 45 successfully completed the course. During the year accommodation at the institute was increased to enable a third year of specialist training for students entering the Department to be given. The first specialist course in agriculture will begin in 1959 and it is anticipated that 28 students will take it. In December the opening ceremony was performed by His Excellency the Governor and was combined with the annual prize giving. Some 200 guests were present at a very enjoyable ceremony.

68. The Arapai Farm Institute started its first academic year in February with an intake of 55 students, 10 of the students admitted were in possession of the Cambridge School Certificate and the remainder, with one exception who was specially recommended, held the Junior Secondary Leaving Certificate.

69. On the 15th September it was necessary, temporarily, to close the institute owing to a strike by the students, who refused to submit their alleged grievances for consideration through the proper channels. Later all students indicated that they wished to return to complete their studies with two exceptions all were re-admitted on the 14th October, since when the institute has run very smoothly.

70. The progress made by students during the year was satisfactory, but lack of knowledge of English hampered the progress of some students holding the Junior Leaving Certificate. Time devoted to instruction was divided almost equally between practical and theoretical work, and particular care was taken to avoid too great an emphasis being placed on academic standards, at the expense of giving the students a sound all-round knowledge of farming practice. As at Bukalasa, it is planned to extend the institute to accommodate the third-year course of specialist training for agricultural students; this course will start in 1960.

(ii) *District Farm Institutes*

71. Building of district farm institutes was deferred until 1959 and it is planned to establish three out of a total of eight by the end of this year. These institutes will offer short courses of training to farmers, chiefs, cultivators, prison warders and others.

(iii) *Farm Schools*

72. A new farm school was opened at Wairaka in Busoga District bringing the total in the Protectorate to seven. These schools will be complementary to the training to be given at district farm institutes and are designed to provide a two years' post-primary course in agriculture for boys academically unsuited for higher studies, who wish to take up farming as a career. Five schools are situated in the Northern Province and two in the Eastern Province.

73. In 1958, two groups of four boys who left the Acholi Farm School, which is run by the Verona Fathers' Mission, made a promising start with establishing their holdings. Two groups of boys who left the school in 1957 continued to manage their farms satisfactorily, despite the loss of two of their original members, who decided to start their own farms. The Aler Farm School in Lango District had a successful year, thirty-five students being in residence, of whom eight successfully completed their training and left to join existing farming groups trained at the school or to start new ones. Seven groups of former students of the school have registered as farmers co-operative societies. Applications to join the school in 1959 numbered 80. In Busoga District the Muljibhai Madhvani Farm School opened on 10th February with 25 pupils. Excellent progress was made in developing the school farm and grounds.

(iv) *General*

74. Regular two-week courses for chiefs and farmers were held at Bukalasa from May to December. A total of 138 men and nine women attended the courses. As in previous years short local courses for chiefs and farmers in the Northern, Eastern and Western provinces were organised in the districts. Unfortunately the number of chiefs attending was less than usual owing to pre-occupation with arrangements for the elections. Refresher courses and courses of cotton spraying were also held in the districts for departmental field staff. Use was again made of county and sub-county shows for staging demonstrations and disseminating propaganda generally. Greater use was made than before of pamphlets and posters for propaganda purposes. In the Northern Province considerable success was achieved with demonstrations arranged on the holdings of progressive farmers. Prison farms continued to afford valuable demonstrations of good husbandry, whilst the agricultural competitions embodying all aspects of good farming were held in the majority of districts. Regular lectures on agricultural topics were given by members of the Department at Nsamizi Training Centre.

(c) *Animal Husbandry and Pasture Work*

75. Progress in encouraging the integration of stock into the farming system is necessarily slow as it requires the abandonment of communal herding and heavy capital outlay on fencing; moreover, the traditional

system of stock management is to keep stock and crops entirely separate. There are indications that individual herding is increasing among the more progressive members of the farming community, who are beginning to link their stock more closely with both annual and perennial crops. During the year more night paddocks were constructed in Lango and Acholi districts, whilst in Teso District the number of movable kraals further increased, although the rate of progress was slow. In Buganda more enclosure of grazing land took place and this was frequently followed by digging out *Cymbopogon afronardus* to improve the herbage. In Kigezi District, supplementary feeding of livestock was more widely practised and 15 farmers planted fodder beet for this purpose. In Teso District a grass legume mixture developed at Serere Experiment Station was planted on selected prison farms for the first time.

(d) Irrigation and Swamp Reclamation

76. The flood irrigation scheme at Ngiminto in Karamoja District had a successful year and the number of people renting plots increased. In the same district, the irrigation scheme at Namalu, which is watered by a permanent stream from Mount Debasien, continued to produce a wide range of crops; rice, finger millet and maize, as well as a wide range of European vegetables were successfully grown, citrus fruit also does well.

77. In Toro District, the head-works on the Kanyampara River for the diversion of water to the Nyakatonzi Irrigation Scheme, were completed in January and provided a steady flow of water for both domestic purposes and irrigation trials which were laid down on sugar-cane and cotton. Both crops were grown on ridges and water was led to them along the furrows. In this way an even distribution of water was applied to a depth of six inches, at intervals of ten days, and both crops made excellent growth. It is estimated that the cotton will yield well over 2,000 lb. per acre.

78. The trials laid down in 1956 by the Kakira Estate in Busoga District to investigate the possibilities of raising sugar-cane yields by supplementary irrigation were continued. Owing to technical difficulties and the high cost of supervision of labour, furrow irrigation was discontinued in favour of the sprinkler method. Experimental results to date indicate that sprinkler irrigation will enable an additional crop to be taken every five years, whilst the individual crops may be expected to yield approximately 30 per cent more than the rain-grown cane.

79. In the heavily populated areas of Kigezi District additional swamp reclamation was undertaken by the Water Development Department in the south Kashambya and in the Rwakihigwa swamps. Good use was made of the newly-drained areas by the farmers, especially during the mid-year break in the rains.

80. Swamp fringes in many parts of the Protectorate were utilised for dry season planting of sweet potatoes, chiefly for providing planting material in the following year; to a less extent other crops such as maize and beans were planted.

(e) Resettlement

81. During the year there were nine resettlement schemes in operation in the Western Province, located as under :

Kigezi District—Rwanga, Kihhi, Bwambarra

Ankole District—Bigyera, Oruchinga, Chezo, Kisharira

Toro District—Bigodi, Nkongora

The most successful areas from the point of view of the number of people settled were those in north Kigezi (chiefly Kihhi) and the Bigyera area in Ankole, where 124 and 199 families, respectively, were settled during the year. Elsewhere steady progress was made with the exception of the Oruchinga, Kisharira and Nkongora areas, which filled up only slowly. The principal movements were from southern Kigezi to Kihhi, Rwanga, Chezo, Bigodi and Nkongora areas, and from Kajara and neighbouring counties in Ankole to Bigyera.

82. In Bigyera, Bigodi and Nkongora and all the north Kigezi areas, strict control over demarcation of plots ensured an orderly settlement and development of the land. With the exception of the Oruchinga area, which experienced severe dry weather during the second and third quarters of the year, cropping in all the settlements was satisfactory. Food supplies were plentiful and considerable success was achieved in establishing cash crops. Tobacco and cotton are promising in north Kigezi; cotton and Robusta coffee have done well in Bigyera and Bigodi; whilst cotton has given good yields in Nkongora.

83. In Amuria County of Teso District where the resettlement area was fully occupied in 1957, the main work was one of consolidation. Satisfactory progress was made by settlers in developing their holdings. In south Busoga the number of families farming in the resettlement area rose from 42 in 1957 to 68 in 1958.

(f) Kigumba Settlement Area

84. The settlement area comprises the whole 20,000 acres of land originally leased to the Bunyoro Agricultural Company, except 1,000 acres which are being farmed by the Department for pedigree cotton seed increase. In addition to raising the production of cash crops in the area, the scheme is designed to serve as a tsetse barrier. During the year 231 families took up residence and the number of holdings allocated rose from 63 to 298. The majority of immigrants were Maragoli from the Nyanza Province of Kenya who proved to be excellent cultivators and rapidly took to the

growing of cotton which was an entirely new crop to them. The total area planted by settlers was 140 acres and the general standard of cultivation was high, particularly that of the Maragoli; at the end of the year it was estimated that the average yield of cotton would be over 700 lb. per acre. In order to ensure orderly development of the area, all holdings were carefully demarcated prior to occupation.

(g) Liaison with African Local Governments

85. In general, senior officials of African Local Governments and chiefs co-operated closely with members of the field staff of the Department in the drive to increase production and the relations between the two organisations were most cordial. This was especially true in the Eastern Province where sub-committees of county teams were appointed to deal particularly with increasing agricultural output in their areas. In Buganda, the Minister of Natural Resources of the Buganda Government toured all counties in connection with the early cotton planting campaign. No new agricultural bye-laws were passed during the year; difficulty was experienced in a few areas in obtaining the co-operation of chiefs in their enforcement. In the majority of districts, however, bye-laws were judiciously applied. In Kigezi District the drafting of a soil and water conservation bye-law had reached an advanced stage by the end of the year, whilst a similar bye-law was under consideration in Bunyoro District.

(h) Mechanical Cultivation

(i) General

86. The symposium on mechanical cultivation held at Makerere College during December reached the conclusion that the Special Development Section of the Department, which is responsible for the development of mechanical cultivation in the Protectorate, had made a significant contribution to agricultural development in the last decade. It was also agreed that the activities of the section had become a permanent feature of the extension services of the Department.

87. The policy for the development of mechanical cultivation continued to be that the Department must lead the way with the contract hire service and move to new areas when farmers themselves or other organisations are capable of operating their own equipment.

(ii) Contract Hire Service

88. Tractor units were maintained at centres in Buganda Province, and Bunyoro, Acholi, Lango and Toro districts, as in 1957. New centres were established in north Busoga District and in Masaka District. The latter unit consisted of one tractor and ancillary equipment and was devoted

to investigational work in connection with inter-row cultivation, and soil and water conservation, in Robusta coffee. The total area cultivated by the contract hire service rose to the record figure of 7,753 acres, compared with 6,172 in 1957 and 5,534 in 1956. The tractor unit in the west of Acholi District was unable to deal with all the work offered during the ploughing season, whilst the unit at Nyakatonzi was kept fully employed during the same period. The average number of hours worked during the year per tractor was, however, only 500 hours, which indicates that approximately half of the potential of the units was utilised. As in previous years the main difficulty was the widely-scattered demand for work which could not be offset by increasing the size of the individual operational area, owing to the disproportionate increase in unproductive travelling and transport. In Toro, Acholi and Lango districts hire rates were lowered to Shs. 45 per acre for ploughing, and Shs. 25 per acre for discing. It is thought that these reductions in charges were mainly responsible for the rise in the area cultivated. The total revenue earned by all tractor units was Shs. 339,000 compared with Shs. 319,000 in 1957. The average running cost worked out at Shs. 21/26 per hour. It is, however, interesting to note that with the new diesel tractors costs were reduced to as low as Shs. 10/87 per hour which augurs well for the future, as the old tractors will be gradually replaced by diesel models. A total of 43 tractors worked during the year of which 11 were Farmall B.E.M., and 29 Ferguson; in addition one Ford Dexta, one Fordson Major and one Nuffield D.M.4 were used. Details of acreages cultivated on contract work were:—

Province or District				Ploughing	Disc harrowing and tilling	Planting	Weeding and ridging
Buganda	..	..	..	610	15	20	—
Bunyoro	..	..	..	681	—	—	—
Toro	..	..	..	1,065	1,049	12	—
Acholi	..	..	..	2,500	335	55	178
Lango	..	..	..	1,017	46	3	—
Busoga	..	..	..	167	—	—	—
TOTAL ..				6,040	1,445	90	178

(iii) *Purchase of Tractors by Farmers*

89. The policy of encouraging the purchase of tractors and ancillary equipment by individuals, farmers' groups and co-operatives possessing the necessary resources and experience was pursued. Outside Buganda the number of privately-owned tractors rose to ten, the increase being in Acholi (two) and Busoga (one). Advice and assistance with maintenance work and repairs were given by members of the Special Development Section units to tractor owners in their areas. In Buganda three new tractors were purchased by private individuals during the year.

(iv) *Investigational Farms*

90. Senge Farm took over the functions of Butasindirwa Farm for testing new mechanised farming techniques. Owing to untimely dry spells, yields of cotton and maize on the farm were only fair, averaging 700 lb. and 10 bags per acre respectively.

91. Kigumba Farm in Bunyoro District, which was originally part of the land developed by the Bunyoro Agricultural Company was again operated by the Special Development Section for the multiplication of pedigree cotton seed. The farm receives seed from the Cotton Research Station at Namulonge and its function is to secure the maximum multiplication possible. In order to achieve this, full advantage is taken of all available mechanised farming techniques, particularly for early planting and spraying against cotton pests. The 1957/58 crop of 160 acres yielded at the rate of 853 lb. of graded cotton per acre. In 1958 a further 160 acres were planted, all of which were sprayed against *Lygus* and other pests. The crop grew extremely well and it was estimated at the end of the year that yields of well over 1,000 lb. per acre would be obtained. Detailed costings were kept and it has been established that with cotton prices at 45 cents per pound and over, cotton growing is profitable at Kigumba. Results with other crops such as maize and beans have so far been disappointing, but this may be due at least partly to the method of production employed and research continues. A herd of cattle for beef and milk production is kept on the farm and it is hoped to work out a sound farming system utilising mechanisation to the fullest extent that is economically possible.

(v) *Machinery Testing and Development*

92. In this work, close liaison was maintained with the East African Tractor and Implement Testing Unit, whose headquarters is at Nakuru in Kenya. The extended test of four tractors (Fordson Major diesel, Nuffield D.M.4, Ferguson F.E.35 diesel and Ferguson F.E.35 petrol) started by the unit at Serere in 1957 was continued and by the end of the year 1,000 working hours, i.e. half of the testing time, had been completed.

93. The modified Fordson Major diesel fitted with special equipment against dust, dirty fuel and bad maintenance, successfully completed 1,000 hours work in Toro District. It is planned similarly to modify a further three Fordson diesels.

94. The "Hawkins System" was successfully demonstrated during the year and the machine is now undergoing a mechanical reliability trial at Serere. The tying unit which cannot be purchased through commercial channels is being manufactured in the Special Development Section's workshops to supply the requirements of research stations and others in the

Protectorate. Other experimental work undertaken by the Special Development Section on testing, modification and fabrication of equipment included the following projects:—

- (a) Finger millet header.
- (b) Hand-seeder for row planting.
- (c) Inertia starters.
- (d) A comparison of double and single groundnut planters for sowing on ridges.

(vi) *Tractor Training School*

95. Two three-month courses were held at Namalere both of which were fully attended. Pupils were drawn from all parts of the Protectorate, but entrance was restricted to tractor owners or the employees of progressive farmers owning tractors. As in 1957, emphasis in instruction was placed on the use of mechanisation in a rational farming system rather than on the purely mechanical aspects of tractor operation and maintenance. It is considered that the work of the School will become one of the most important functions of the section.

(i) *Ox-drawn Equipment*

96. The policy of the Department is to encourage the use of ox-drawn equipment in new areas, whilst widening the range of equipment used. In those parts of the Protectorate where cattle are kept but not used for draught purposes, emphasis is placed on the development of ploughing; in other areas particular attention is being given to row-cropping and inter-row weeding.

97. In new areas, particularly in Buganda and in Toro District few farmers could be interested in ox-ploughs. In Ankole District, where training of oxen was undertaken by the Veterinary Department, progress was hampered by the popular belief that an ox, trained to the plough, is useless for dowry purposes or slaughter.

98. In Teso District, extensive use is made of ox-ploughs and keen interest was shown in row-cropping and inter-row cultivation, as a means of reducing the labour of weeding. Approximately 100 ox-weeders were in use during the year. In Busoga District, comprehensive demonstrations were arranged to show farmers a full range of operations which it is possible to carry out with oxen. This was followed by a series of short courses on ox-training and in the rudiments of implement operation. It soon became apparent from these courses that little progress would be achieved unless facilities were made available for training oxen. The outcome was the establishing of an ox-training centre operated jointly by the Busoga African Local Government and the Veterinary and Agricultural

departments. Training was carried out by the staff of the centre, the owners of the cattle paying a training and grazing fee. So far 40 oxen have been trained at the centre.

99. In the Northern Province the ox demonstration team in Lango District continued to operate at Ngetta Farm. Great interest was shown in the demonstrations; but the number of inter-row cultivators and weeders in use in the district remained small. Five ox-cultivators were purchased in 1958. In Acholi the number of ploughs continued to increase in all parts of the district, but so far only one farmer has purchased an ox-weeder. In West Nile District where practically no use is made of oxen for draught purposes, the ox-demonstration team continued to work on contract to demonstrate the use of ploughs.

(j) Farm Planning

100. During 1958 the numbers of planned farms in the Eastern Province and Buganda were increased to 13 and nine, respectively. In the Western Province where farm planning is restricted to Kigezi District no detailed planning took place, but over 180 farms were given improved layouts. In the same district widespread enclosure of holdings by live hedges took place with the aim of securing title to the land, and in a few cases voluntary exchange of land was arranged to allow of consolidation prior to enclosure. No farm planning was undertaken in the Northern Province.

101. In the predominantly arable areas of the Protectorate the main improved methods incorporated in the farming systems recommended to farmers were increased use of ox-drawn and hand operated implements, together with the introduction of row cropping for all crops, particularly finger millet. Integration of stock and crop is secured by paddocking the resting land, but this is only advocated where the high cost of fencing can be justified by the anticipated return. Spraying against *Lygus* and other cotton pests was advocated in the Eastern Province. Diversification of production was encouraged by the introduction of bee-keeping, fish and poultry farming and other projects, depending on local circumstances. In the more fertile areas of Buganda where the main source of agricultural income is coffee and bananas, the chief improved farming method advocated was the efficient management of perennial crops. In many cases the farming system included cattle keeping on a systematic basis, and many farmers situated near centres of population took up fish and poultry farming.

102. The general response by farmers to the farm planning service was most favourable and in many areas progress was restricted to the amount of work which available staff could undertake. Some of the planned farms in Teso District completed a full season's work under the improved system of farming and the results obtained so far have been

encouraging. Detailed records are being kept of all planned farms, which, in addition to providing the necessary information for the farmer regarding his business, also provide details of costings and management which have not hitherto been obtainable by departmental officers from peasant holdings.

103. In collaboration with Dr. Raeburn of the London School of Economics, work on case studies of African farms and farming systems was started. Great importance is attached to this work which is being undertaken by the two agricultural economists on the establishment of the Department.

104. The policy of the Department regarding farm planning is to hasten slowly, and to obtain reliable data from a few planned farms operating under different ecological conditions. Proven and advantageous economic returns must be obtained from the new systems of farming which are advocated before expansion takes place.

VI. INVESTIGATIONS

(a) Soils and Natural Vegetation

(i) *Soil and Vegetation Surveys*

105. Progress in these two projects was maintained according to the original programme. Only one-quarter of the Protectorate remains to be mapped for soils and one-half for vegetation. The soil mapping is now complete for the Eastern and Northern provinces and the first draft reports are ready; Bunyoro District, a greater part of Mengo District and approximately half of Ankole District have been surveyed on the 1 : 250,000 scale and one county of Karamoja is left to be soil surveyed on the 1 : 50,000 scale.

106. The vegetation map of the Eastern Province and its accompanying memoir was completed and the Buganda map started. Derived maps of the Eastern Province were drawn on the scale of 1 : 1,000,000 to show land-use, cultivation intensity, physiological potentials and natural climaxes.

(ii) *Soil and Plant Chemistry*

107. In continuation of previous work, experiments were carried out at Kawanda Research Station to determine by what mechanisms nitrate accumulates in the top soil. Ammonia and nitrate oxidizing organisms have been found in soils from all districts in the Protectorate, except one extremely acid, drained swamp soil from Kigezi, and one sodium clay from the Semliki Valley. Small field trials showed that nitrate accumulation in the top soil was reduced by spraying with sodium trichloroacetate, a micro-biological inhibitor, and stopped by drying below 6.5 per cent moisture content. All this supports the view that the main mechanism involved is

microbiological nitrification. An alternative theory is that nitrate moves upwards with subsoil water when the top soil is drying, so leading to an accumulation in the surface crust. Experiments designed to test this theory were unfortunately harmed by an unusually heavy fall of rain shortly after they were laid down and it is, at the moment, not certain whether the results should be interpreted as being in favour of the theory or not.

108. The effects of soil conditions and of grass and legume fallows on the nitrogen status of the soil were also investigated. 'Two years' fallow under *Chloris gayana* and inoculated *Stylosanthes gracilis* followed by a test crop of maize after digging in the fallow, resulted in an increase of nitrogen in the 0-6" soil layer of respectively 96 and 106 lb. per acre; if the nitrogen removed in the maize crop is added to these figures, the net gain was 202 and 253 lb. per acre; these gains were significantly greater than those under continuous cropping or a rotation of green manure followed by cotton.

109. Over 3,000 soil samples were analysed during the year, most of them submitted by the soil surveyors. Adaptations were made to the spectrograph for the porous-cup technique which enables many more elements to be accurately determined. By this method, what is believed to have been the first occurrence in Africa of magnesium deficiency symptoms in tea was confirmed in leaves collected in the Kivu District of the Belgian Congo. Selected soils were tested in pots for trace element deficiencies.

(iii) *Soil Amendments—Fertilizers*

110. Yields of seed cotton on the two fertilizer experiments at Kawanda were very low but responses to treatment were considerable. As the second residual test crop, after a complete fertilizer mixture, an increase of 83 per cent on a 187 lb. per acre crop of seed cotton was obtained; lime produced a further 29 per cent increase while elephant grass ash gave 125 per cent increase. In the same plots the following soya bean crop of 368 lb. per acre showed an increase of 10 per cent from the fertilizer plus lime treatment. In the "time of application of nitrogen" experiment a dressing of 2 cwt. per acre of sulphate of ammonia at squaring produced a 54 per cent increase on a 310 lb. per acre crop of seed cotton.

111. Further trials at Serere Experiment Station on a field scale with food crops have followed on the results of small plot experiments. An early planted millet crop was increased in yield by nearly 900 lb. of grain per acre by applying 40 lb. each of nitrogen and phosphate. On this 2½ acre field the extra profit would be about Shs. 300. It should be noted, however, that an adjacent small plot trial planted late and suffering badly from heavy wash and consequent gaps in the stand gave only small yield increments from a wide range of fertilizer mixtures. A large plot trial with groundnuts, yielding well at 1,000 lb. shelled nuts per acre, gave a yield increment, due to fertilizer, of only 100 lb. Field trials with dwarf, short-term sorghums have given disappointingly low yields, largely due to excessive bird damage. Attempts to increase the grain yield of this crop

in the second rains by the use of fertilizer were unsuccessful, even though increased vegetative growth was obtained. It is likely that low rainfall limited the fertilizer response.

112. Trials with inorganic fertilizers were carried out on more than 400 farmers' plots of millet, throughout Teso and Bukedi districts. An average yield increase of 400 lb. per acre of grain was obtained, but the range was great and only about 50 per cent of the farmers could be expected to make additional profits by using the fertilizer. Detailed trials were carried out at Labora Farm near Gulu and at six prison farms in Bukedi District. Responses at Labora Farm with millet were small, but a tobacco crop showed remarkable benefit from applied phosphate. Cotton, too, at this site seems likely to benefit from added phosphate and nitrogen, but yields are as yet incomplete. In Bukedi District economic increases averaging 40 per cent have been obtained with a nitrogen-phosphate mixture. Urea does not give as good results as sulphate of ammonia, and phosphate is of importance only if the nitrogen dressing exceeds 20 lb. per acre. Splitting the nitrogen dressing had little effect but the benefit derived in the trials from row planting was quite obvious, in comparison with the adjacent broadcast crop. In Bugisu District 85 pairs of coffee plots are being used to study the effect of a light dressing of sulphate of ammonia on the peasant crop.

(iv) *Soil Amendments—Organic Manure*

113. At Kawanda 10 tons per acre of compost gave no benefit to a 1,800 lb. per acre sorghum crop, neither did tie-ridging to conserve moisture help in any way.

114. The large long-term fertility experiment laid down at Serere Experiment Station in 1936 continued to demonstrate the value of farmyard manure. Crop yields for the last twenty years have now been statistically analysed. Earlier findings that farmyard manure in only small quantities and infrequently applied (up to five tons per acre every five years) is the most important treatment, are confirmed. Yield differences due either to varying lengths of rest during the five year rotation, or to differing types of resting cover, are relatively small in comparison. A surprising feature is that, even under the most heavily-cropped rotation without manure, the drop in productivity over the 20-year period has been only relatively small. It is believed that this result has only been achieved by the strict soil conservation measures which are resultant from the layout of this experiment. The manurial effect is cumulative and may be best represented by the statement that each time five tons per acre of manure is applied an extra 70 lb. per acre of cotton results in the immediately following crop, i.e. after the fourth application the best estimate of the yield difference between unmanured and manured plots is 280 lb. per acre. Cotton grown two years and four years respectively after the last application of manure increases cumulatively by 55 and 35 lb. cotton per acre per application of manure. The similar effect

on sorghum is 60 lb. dried heads per acre, and with eleusine (grown five years after manure was last applied) 40 lb. dried heads. The effect on groundnuts is large and more variable, but is best estimated as a cumulative gain of 110 lb. unshelled nuts per acre, per manuring.

115. The value to cotton of dung dropped by cattle grazing land at night during the year prior to ploughing, has also been studied. Light grazing has led to an increase in the following cotton crop of about 100 lb. per acre compared with ungrazed fields, whilst very heavy grazing, resulting in a much greater concentration of dung, doubles this response. On this particular trial the assistance of the Soil Physics Section of E.A.A.F.R.O. is gratefully acknowledged. They showed that although the trampling, resultant from the heavy stocking rates, slightly reduced the acceptance of rainfall by the pasture, these differences between grazed and ungrazed plots disappeared after ploughing. However, only four months after these fields were ploughed the rainfall acceptance had dropped by nearly 60 per cent in spite of an increase of more than 100 per cent in the volume of large pore spaces.

(b) Annual and Medium-Term Crops (Botanical Investigations)

(i) Maize

116. Trials over a number of years have shown that there are two varieties, Muratha and K8, which have highly desirable characters. Muratha yields very well, but it matures too late for this variety to be grown in the first rains, prior to cotton. K8, on the other hand, is an early-maturing variety, but its yielding capacity is only fair. Attempts have been made to improve both varieties; in Muratha, to shorten its maturation period, and in K8 to increase its yield. This improvement was sought in two ways: by recurrent selection within each variety and by reciprocal crosses between the two varieties. Using the first method, the second combination of selected lines from within each variety is now being compared with the parent material. The parent material was itself derived from mass-selected strains from the original variety. In trials at eight centres, the mass-selected bulk outyielded the parent variety by 10 to 20 per cent, but the maturation period was not often shorter. Further improvement in yield by selection may therefore be difficult, but it is possible that a quicker maturing Muratha can be obtained in this way. Reciprocal crossing of K8 and Muratha, followed by back-crossing to the respective parent and selfing, has now resulted in the acquisition of a number of promising lines. The best selections will be bulked within each family and compared with both parents and their derivatives, in country-wide trials.

117. Two main sources of resistance to tropical American maize rust (*Puccinia polysora* Underw.) have been supplied by E.A.A.F.R.O., namely:

AFRO 24: SLP 20-4a. a Mexican variety obtained from West Africa; and

AFRO 29: Colombia 2. a white flint variety from Colombia.

118. These varieties have been widely used in the breeding programme to introduce resistant genes to the local varieties K8 and Muratha. Triple crosses of AFRO 29 $\times$ Katumbili $\times$ K8 or Muratha have also been used. Katumbili matures slightly later than Muratha and its yielding capacity is somewhat slightly less at Kawanda, but it was considered that greater variability would give a wider scope for selection purposes.

119. The first rust-resistant Muratha, obtained by an initial cross of AFRO 24 and Muratha, followed by back-crossing to Muratha, was compared with strains of K8 and Muratha at 12 sites in the maize-growing areas during 1958. On average, the yield of the rust-resistant strain was better than K8 and Muratha bulks, but not as good as the improved strains of these two varieties. It matured substantially earlier than the other Muratha strains, but later than the K8 strains.

120. Homozygosity for rust resistance has been established in other lines of K8 and Muratha, and these are now being multiplied for field trials in the coming season.

121. With the greater use of early-maturing varieties, such as K8 and the rust-resistant strains, leaf blight (*Helminthosporium turcicum* Pass.) has increased in importance, because these are more susceptible to the disease than the older varieties of the Muratha type.

122. It was found during 1957 that a twice-weekly application of zineb increased yield, often by more than 50 per cent, although the chemical did not greatly decrease the incidence of blight. No other disease was markedly affecting the unsprayed plots, but there may be a nutritional effect of spraying by the application of zinc and sulphur. In order to elucidate this effect, other chemicals have been compared with zineb in field trials. Preliminary examination of the results indicates that increase of yields of similar magnitude can be obtained by spraying other dithiocarbonate salts, thiram and captan. The effect could not therefore be due to the zinc component, as these other chemicals do not contain zinc, but sulphur was present in all chemicals tested. Further work is required to separate the fungicidal and possible nutritional effects of sulphur.

123. The epidemiology of leaf blight in Uganda is very imperfectly known, and studies were commenced on this aspect 18 months ago. Trials conducted in both 1957 and 1958 have shown that mid-year plantings suffer most from blight, as the greatest infection occurs during periods of dry weather between plant emergence and flowering; maize sown in May and June is often confronted with a dry period, at this stage of development.

124. The course of infection has been studied on June-sown maize, on plants naturally infected and those artificially inoculated. These studies will show the extent of losses that can be expected with infection initiated at different stages in the life of the maize crop, and the effect of weather conditions on the development of the disease.

(ii) *Bananas*

125. In the variety trial at Kawanda, the modification of the soil conditions by the application of fertilizers and the change in inoculation methods have failed to induce infection by Panama disease (*Fusarium oxysporum f.cubense* (E.F.S.) Snyder and Hansen). All work on varietal reaction to Panama disease will, in future, be centred in Ankole District.

126. At one naturally-infected site at Nsika, Ankole, nine of the 20 varieties from Buganda were infected after one year's growth. Now that it is possible to obtain infection readily in these naturally infected gardens, other varieties will be sent from Bukalasa to ascertain their reaction to Panama disease.

127. Further banana clones have been collected and planted at Bukalasa Experiment Farm. Collections were made in Bukedi, Busoga, West Nile and Kigezi districts, completing the Protectorate-wide survey. Observations on botanical features of the various types continue at Bukalasa.

(iii) *Sugar-cane*

128. In the heat-treatment trial at Bukalasa on ratoon stunting disease data from the plant and two ratoon crops show that the yield from the heat-treated setts is approximately 28 per cent greater than that from infected cane; this is an average gain in five varieties. Some varieties such as POJ 2725 and POJ 2878 are more affected by ratoon stunting disease, whereas yields of Uba and POJ 2961 are not markedly affected until the second ratoon crop.

129. Eight new varieties have been released from open quarantine at Kawanda to the sugar estates, for comparison with the standard varieties. In the past, the most promising of the newly-introduced varieties were selected at Kawanda for inclusion in replicated trials on the estates. It has now been found that the relative performance of the varieties can be entirely different at Kawanda. In future, all new varieties will be grown at the estates in observation plots in the first instance, and selection of the best types for testing in formal trials will be made from these plots.

(iv) *Sorghum*

130. An intensive study of the sorghum crop has been made at Serere over the past six years. It was found that the large number of varieties collected at Serere could be placed into a few definite categories and by certain ethnological groups to fit into specific farming systems. At present in the north and east, the sorghum crop is harvested at the wettest time of the year. It was concluded that longer-term sorghums are needed to be planted immediately following earlier planted first rains crops, to come to harvest at the beginning of the dry season.

131. The deleterious factors affecting the sorghum crop are firstly grain insects, and secondly birds. The prospect of obtaining resistance to both pests is not good; weevil-resistant grains are very bird-susceptible. Grains with a fair degree of insect resistance with glumes entirely enclosing the seed have been produced, but when these ripen in July–August they are all eaten in the immature stage by birds. When these ripen in November they partly escape damage as there are then fewer birds feeding on the crop. But the problem of removing the glumes from such grains, remains to be solved.

132. Since the inception of sorghum breeding at Serere, the following progress has been made:—

The production of various 90-day dwarf sorghum lines of similar grain type to the local varieties, but the local varieties are tall and they take more than 110 days to reach maturity. These improved lines are now being grown at Serere and a bulk of six lines is being grown at all variety trial centres in the Eastern Province, selections being made locally for both food and beer types;

The selection of three sweet-grained (mealy endosperm) types which can be grown free from bird damage in the second rains, in various parts of Acholi. These were issued to growers during 1958, and proved very popular.

The establishment of various panmixia of lines each panmixture being a bulk of varieties having certain characters in common, e.g. early or late maturity, bitter taste, corneous endosperm.

133. The work on sorghum breeding has now been handed over to a Senior Plant Breeder of E.A.A.F.R.O., who will carry out a breeding programme for the whole of East Africa at Serere.

(v) *Finger Millet*

134. Agronomic trials at Serere have shown that the main problem of the finger millet crop is establishment, and that the best stand can be achieved by early sowing in rows, on new land prepared late in the previous year. When sown in moist ground, the best seed rates are:—

10 lb. per acre in $\frac{1}{2}$ ' rows

5 lb. per acre in 1' rows

2½ lb. per acre in 2' rows

At these seed rates, the amount of seed sown per row remains the same, irrespective of the width between the rows.

135. Blast disease, caused by *Piricularia oryzae*, destroys 10 per cent or more of the heads in the Northern and Eastern provinces. A variety from Mozambique, No. 359, was found to be immune, although infection was heavy on other varieties grown on adjacent plots. This immune variety is a large glumed form with a low threshing percentage and low yield, but it may be a useful source of resistance for crossing with the local varieties.

136. Studies have also been made on the morphological characters of the varietal collection. The main distinguishing feature is the sequence of grain colour during ripening, and the length of the "fingers".

137. The varieties have also been classified on their maturity periods. At Serere the earliest mature in 90–110 "drought-free" days. Most of the varieties take 100–120 days and the latest require about 115–135 days. When conditions for growth are good throughout the growing season the crop may mature up to 20 days earlier than when conditions are less favourable. When severe drought periods intervene the time to maturity is increased by the number of days of drought.

(vi) *Groundnuts*

138. Agronomic trials at Serere have shown that, under the particular climatic conditions in Teso, the best net yields can be obtained by sowing in rows at 10 seeds per foot. The rows can either be single at a distance of two feet, or in twin rows six inches apart and $2\frac{1}{2}$ feet between each pair. There is little difference between ridge and flat cultivation, except that it is difficult to sow twin rows on a ridge, and a single row on a ridge does not yield as well as twin rows on the flat.

(vii) *Advisory Plant Pathology*

139. About 70 pathological specimens have been submitted at Kawanda during 1958 to determine the cause organism. The most frequent host plant examined was bananas, indicating that there is still considerable interest in the crop, in spite of the lack of attention often paid to its cultivation.

140. *Beniowskia sphaerodea* was common on elephant grass, (*Pennisetum purpureum*); heavy infection occurred at Kawanda and it was also frequent at Kumi and Serere in Teso District. At Kawanda there appeared to be more infection on cut or grazed plots, and cattle tended to leave the worst affected clones. There was also a terminal leaf scorch associated with heavy infection at Kawanda.

141. In order to assess the value of new fungicides placed on the market, spraying trials are made comparing their relative efficacy to control tomato diseases. At Kawanda, tomato crops are attacked by four major diseases: Septoria leaf spot, caused by *Septoria lycopersici*; early blight, caused by *Alternaria solani*; late blight, caused by *Phytophthora infestans* and leaf mould, caused by *Cladosporium fulvum*. One or more of these diseases attack every season, and this makes the tomato crop an ideal test host plant. Septoria leaf spot is the most common of the diseases and maneb, captan and thiram were found highly efficacious in controlling it and consequently maintaining a high yield level.

(c) Annual and Medium-Term Crops (Entomological Investigations)

(i) Cotton

142. Extensive insect surveys have been carried out in the Northern, Eastern and Western provinces. Spiny bollworm (*Earias* spp.) was found to occur in many of the larger wild Malvaceae in all areas, including Buganda. In several isolated cotton plots in Karamoja *Earias* was present, whereas *Lygus vosseleri* could not be found, even on cereals. An extremely complex pest situation exists in the Western Province, Mirids being common, *Earias* common, whilst several species of stainers (*Dysdercus* spp.) invade the crop, the stainer complex being very much a function of time of maturation of the crop.

143. Laboratory experiments have shown that *Earias* larvae cause severe damage to the cotton plant, boring into growing points, removing many small fruiting points and "tattering" leaves. Extensive damage can occur at very low population levels, since, in young plants, no single boll or growing point is enough to sustain a larva through to maturity, and the larvae consequently wander extensively over one or more plants. Attempts are being made to establish a sampling technique for *Earias* that will include all its manifestations of damage. Counts in connection with this work have revealed figures of interest in relation to the shed-picture of cotton at Kawanda during the year. Fifty-five per cent of all sheds recorded were from monopodia, the great majority of these being basal monopodial bolls: 211 sheds were recorded from one plant over a 15-week period. From another plant, recorded at Serere a succession of over 40 bollworm sheds was recorded, all due to *Earias*.

144. Two major spraying experiments have been conducted at Serere. In both the insecticide was D.D.T. at 1 lb. per acre. A repeat of the 1957 time of commencement trial largely confirmed the previous results. There were no significant differences between the yields from a 35-, 55- or 75-days from germination spray start, but all were highly significantly better than the unsprayed control: in terms of yield per acre the difference was about 600 lb. seed cotton. An analysis of clean and dirty cotton showed that the control and 35-day treatments had more dirty cotton than the 55- and 75-day treatments, which would indicate that the two latter treatments are best. However, in 1957, the 75-day treatment yielded no more than the control, probably due to a dry September: in general, therefore, the experiment confirms the present recommended practice of starting spraying at eight weeks from germination.

145. The second experiment was designed to test the effectiveness of reduced spray coverage: applications were four at ten-day intervals; three

at 15 days; two at 20 days and an unsprayed control, all treatments commencing at eight weeks from germination. Final yields of total cotton showed significant differences:—

Treatment	Yield (lb./acre)	L.D.S. @ 5%
	<i>Mean</i>	
4x	801	164
3x	691	—
2x	401	—
0	208	—

Differences significant at $P=0.001$

146. The yield differences show a strong relationship to leaf damage counts, which revealed significant treatment differences, and to shed counts, which did not reveal significant differences. A repeat of this trial will be laid down in 1959.

147. A heavy attack by tea mite (*Hemitarsonemus latus*) on Serere cotton afforded an opportunity to check visual observations that D.D.T. controlled this mite. Counts made on the frequency of application experiment showed, however, that varying numbers of applications of D.D.T. had no significant effect upon mite populations, either way, neither could major differences be found in fruiting point counts on attacked and unattacked plants. It thus appears that, on the evidence so far, tea mite has little effect on the cotton plant, and D.D.T. within the range of applications tried, neither increases nor decreases the population.

(ii) Cereal Pests

148. An experiment on stalk borer control was laid down at Serere on second rains sorghum. Previous work had indicated that cereal stem borers were not a serious problem in Uganda, but an experiment at Serere in 1956 showed that, in spite of apparently poor borer control, 1 per cent D.D.T. dust had given considerably higher yields than other treatments, including control. The 1958 trial compared a few treatments with several replicates, the treatments being 1 per cent D.D.T. dust at 5×1 week intervals; 2 per cent dust at five and three times fortnightly intervals and an untreated control. All treatments gave a good degree of control of stalk borer, which persisted long after treatments ceased, but there were no differences in yield. This confirms the survey result that sorghum stalk borers are of little economic significance, and apart from minor work of more academic interest, that will be pursued as opportunity offers, the subject will be dropped from the section programme.

(iii) Miscellaneous

149. The Kawanda collection of insects increased considerably during the year. A census of type material revealed almost 200 species of which

paratypes are in the Kawanda collection; current taxonomic work on Miridae, some Lepidoptera and Diptera will increase this total considerably, apart from occasional additions from material sent from overseas.

150. The light trap has run successfully for a complete year. Comparative data on seasonal incidence can now be accumulated; already it has been shown that many major pests, e.g. *Earias* spp., *Heliothis* spp., and *Cylas* spp., come in sufficient numbers to allow of respectable analyses being made. Such work enormously increases our knowledge of the annual cycles of insect pests, enabling in many instances a more rational, and therefore satisfactory, explanation of the causes underlying the incidence and activity of these insects.

(iv) *Stored Products Research*

151. Two aluminium silos and one plywood silo, each of 20 tons capacity, have been erected, and a trial run, with about 15 tons of maize is under way, in one silo.

152. Work on the control of Bruchids in grain legumes is nearing successful completion, as also are investigations into control of maize pests in cribs of simple design. In both cases control is based upon Lindane dusting; this work is being written up, and a departmental instruction sheet will shortly be prepared.

153. Laboratory work into the biology of several of Uganda's major storage pests continues, and an investigation has commenced into the apparent insecticide resistance of a strain of *Oryzaephilus surinamensis*, originating from Namulonge. The survey of storage pests of Uganda has continued.

154. An extremely successful fumigation of maize at the Jinja Grain Storage Plant was done with Phostoxin, an aluminium phosphide fumigant. A high degree of control was achieved, and it would appear that this product has a considerable future for bulk fumigation, under suitable conditions.

(v) *Machinery*

155. The main interest has centred upon machines to use in team-spraying techniques for *Antestiopsis* control. Both "ordinary" knapsacks of the hydraulic type, and motorised knapsacks have been investigated, and recommendations for improving the machines have been made.

156. A new and promising air-blast sprayer has been tried on approximately 100 acres (ploughed by the Special Development Section of the Department) of cotton at Kasese in Toro District. Again, some improvements have been suggested, but this preliminary trial has shown that there may be considerable use for this type of machine for spraying in areas in which the Special Development Section is working, or where the traditional cultivation method is to open large blocks of land. Fifteen acres



PLATE I. Paddocking with movable hurdles in Kigezi
[Photograph by G. W. Anderson]



PLATE II. Supplementary feeding in Kigezi District
[Photograph by G. W. Anderson]



PLATE III. Drying Robusta Coffee Cherry on raised mats in Buganda
[*Photograph by R. E. Oliver*]



PLATE IV. Drying Robusta Coffee Cherry on wire trays in Buganda
[*Photograph by R. E. Oliver*]



PLATE V. Elephant Grass Ley at Serere Experiment Station
[Photograph by W. R. Ingram]



PLATE VI. Cattle at Kigumba Farm, Bunyoro District
[Photograph by Department of Information]



PLATE VII. Multiplication of Pedigree Cotton at Kigumba Farm, Bunyoro District
[Photograph by Department of Information]

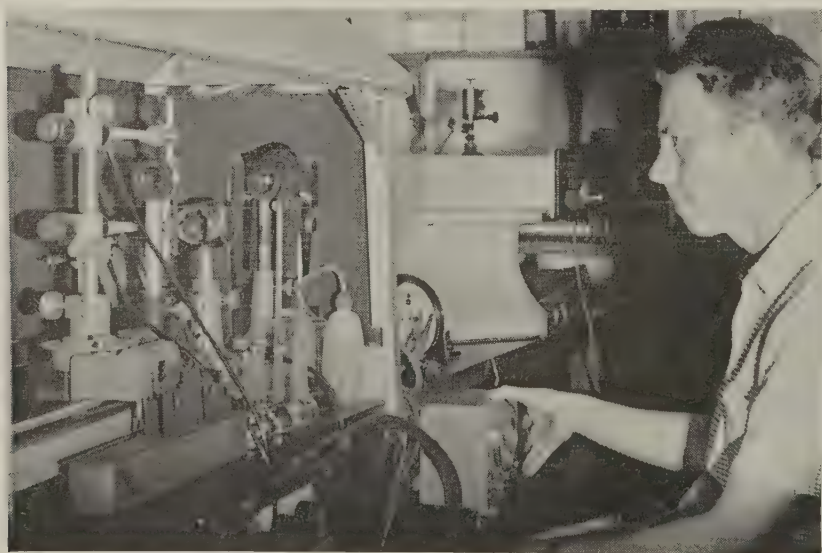


PLATE VIII. Spectographic Analysis of Soil and Leaf by Porous Cup Method,
 Kawanda Research Station *[Photograph by C. D. Ollier]*

an hour, at 10 gallons of spray per acre, were achieved during the Kasese operations, and it was demonstrated that where conditions are favourable this method of spraying can appreciably reduce spraying costs.

(d) Perennial Crops (Coffee Research Unit)

(i) *Chemical Control of Couch Grass* ("Lumbugu", *Digitaria scalarum*)

157. Following the success of the small-scale trials on the control of couch grass with Dalapon reported previously,* large-scale trials were laid down to test the method with a view to practical applications and to obtain costings. The trials confirmed that satisfactory control of the weed can be obtained in coffee with two applications, each of 5 lb. of the chemical per acre. The volume of water in which this quantity of chemical is dissolved may be varied within limits but for convenience in measuring in the field 88 gallons were used. The cost on a large scale worked out at about Shs. 86 per acre per application. Subsequent control measures to avoid reinfestation, consist of spot treatment of any patches of the weed which appear. The spot treatment is done by "lumbugu" patrols, who carry out regular inspections.

(ii) *Arabica Coffee Breeding*

158. The first generation of hybrids incorporating rust resistance genes from the Sudan and Abyssinian types were planted out at Kawanda.

159. Observation plots of a number of Mysore and Tanganyika selections shown as likely to be resistant to our rust strains were planted at a number of departmental farms.

160. Further information obtained from the Bugisu variety trials has shown the very marked relationship between rust attack, die-back and altitude. The relationship of cropping to rust attack was clearly demonstrated: varieties showing a considerable measure of resistance throughout the season, succumbed when the crop was nearing maturity. The number of leaves carried bore an inverse relationship to the number of leaves attacked by rust. There was an interaction between varieties and centres for the amount of canopy carried. The variety K7 behaved well at all centres.

(iii) *Robusta Coffee Breeding*

161. Two more clonal variety trials were planted, at Kukumiro and Nakabango. The pace of planting these trials was slower than desirable because of lack of adequate propagating facilities: this will be remedied shortly. The trials at Kawanda have shown precocious and heavy bearing, typical of clonal material in comparison with seedlings.

*Annual Report 1957, paragraph 130.

162. Following the discovery that receptacles would persist for up to 100 days even though unfertilized, all further compatibility testing was carried out in the laboratory. With self-pollinated flowers, in no case has the pollen tube been found to penetrate farther than the papillary layer of the stigma. There was no evidence of cross-incompatibility.

(iv) *Coffee Pathology*

163. As had been suspected, the brown lesions frequently found on Robusta leaves, were found to be caused by a *Colletotrichum*, most probably *coffeanum*, and a similar type has been isolated from lesions on berries. Sudden die-back of leaders has been associated with a *Fusarium*, producing symptoms similar to those of tracheomycosis.

(v) *Coffee Pests*

164. Fundamental to any study of the biology and control of an insect, is an adequate population sampling procedure. It is, unfortunately, true that for most coffee pests such information is lacking. Considerable effort, in co-operation with the Coffee Research Unit, has been devoted to providing such an estimate for *Antestiopsis* and berry borer on Arabica coffee, with some success in the case of the former pest only. Analysis of many previous *Antestiopsis* test-spray results revealed that they would not fit any known distribution; this, combined with the great gaps in our knowledge of *Antestiopsis* population structure in general, suggested very strongly that the test-spray system elaborated in other territories might be inaccurate. Investigations have shown that a systematic sample, of either a fixed number of trees, or a fixed percentage of trees, taken across a diagonal produce a population frequency distribution curve that is negatively skewed, the amount of skew depending on the general level of populations involved; a skew-normal distribution is good evidence that the sampling technique adopted is at least a considerable improvement upon the previous techniques. Concurrently, investigations have been made into the efficiency of various test-spray insecticides and into various other minor matters of general technique. A standard sampling procedure, based upon ten trees taken across a diagonal, can now be recommended, of which the errors of sampling and recovery are known. This work is being written up.

165. Extremely good control of *Antestiopsis* by Malathion has been obtained in work in Ankole and Toro districts; for these areas two pints of a 50 per cent concentrate per acre would appear adequate. There is, however, little doubt that if pruning was timed immediately to precede spraying, one pint per acre would suffice: investigations are pending on this aspect.

166. A pilot scheme using spray teams was carried out in the Ibanda area of Ankole in March. One hundred and eighty acres of coffee were sprayed at a cost which varied according to the type of sprayer used, of

between Shs. 30 and Shs. 40 per acre. Excellent control was obtained which has continued to date. Although yield figures could not be obtained, the out-turn from dried cherry from the area increased by 6 to 9 per cent. An estimate of the number of beans damaged by *Antestia* showed a drop from 39 to 17 per cent.

167. On Mount Elgon, *Antestiopsis* has been controlled by a D.D.T. Malathion mixture, but in view of the dangers involved in the use of D.D.T. on coffee, work is in progress on the evaluation of Malathion alone.

168. There is evidence from previous trials that berry borer can be controlled by Lindane and Dieldrin. However, it has become apparent that the successful conduct of spray trials against this pest depends in no small measure upon a satisfactory sampling technique. Spray trials have therefore been suspended while this is investigated.

(v) *Coffee Physiology*

169. Investigations on the cropping behaviour of Robusta coffee were continued. Examinations of more populations confirmed the strong correlation existing between the total yield for the first four years of bearing and that for the fifteen or more years usually regarded as essential for variety testing. Examination of the cyclic bearing behaviour showed that there was a strong negative correlation between the yields in successive "on" and "off" bearing periods—in other words, the bigger the crop in an "on" period the smaller the yield in the succeeding "off". The biennial bearing habit becomes more marked with time, but the year to year differences are less as the result of a fall-off in yield with time.

(vi) *Coffee Agronomy*

170. An economic response to the application of nitrogen was obtained with a small fertilizer trial at Kawanda, in spite of the very heavy application used: foliar application of magnesium gave a negative response.

171. The ground treatment trials at Namalere and Kituza began to show a favourable response to clean weeding, whether by hand or mechanically, but further yield years will be required before it is known whether the increase is economic, and is justified by the extra soil conservation effort required. Positive responses to the application of nitrogen also started to show at Kituza.

172. It was found that at Kituza, any form of clean weeding required the strictest attention to soil conservation; no form of all-over clean weeding is practised therefore, except where it is an experimental treatment. Terracing to a very marked degree is evident on a ten acre planting made at Kituza in April, 1958, where clean cultivation has only been carried out in the tree rows: thus it is evident that even on a three degree slope such as this, stop-washes are required at ten foot intervals on the contour.

(vii) *Coffee Processing*

173. Work on processing was continued mainly with the object of finding cheap effective methods of pulping, and of drying cherry from the wet to the "kiboko" stage. Some progress has been made with both these projects. The Uganda Electricity Board is co-operating on the drying projects.

(viii) *Cocoa*

174. Four thousand seedlings were distributed to the Buganda Agricultural Services in April 1958. Two thousand seven hundred will be available for distribution in April 1959. Work on selection amongst the local types is continuing.

(ix) *Citrus*

175. It is now accepted that virus infection is general in citrus grown in Uganda. The most disturbing feature during 1958 was the widespread decline of reputedly sweet orange seedling trees in Mengo District of Buganda. It is now suspected that these trees are actually hybrids with susceptible species, possibly *Citrus aurantium*, and that the lack of attention paid to these trees has reduced their tolerance to the virus.

176. New importations of sweet orange seeds have been sown at Serere, and it is hoped that the trees from these will form nucleus stocks for the replacement of the older "varieties".

(e) *Farming*

(i) *Pasture Agronomy at Kawanda*

177. A range of indigenous and exotic legume species are under trial to ascertain their suitability as pasture legumes for incorporation in ley mixtures with grass species.

178. It has been found that the outstanding species for incorporation in leys with *Chloris gayana* or *Panicum maximum* are *Medicago sativa*, *Calopogonium mucunoides*, *Glycine javanica* and *Trifolium semipilosum*. Species showing the most promise for association with *Pennisetum purpureum* are *Centrosema pubescens*, *Pueraria phasecoloides*, *Glycine javanica* and *Desmodium asperum*. It has also been shown that Kawanda soils contain *Rhizobium* strains capable of fixing atmospheric nitrogen in association with a number of tropical legumes. Species of *Trifolium*, *Medicago* and *Melilotus* do not nodulate in Kawanda soils unless previously inoculated with the effective *Rhizobium* strains, but no further inoculation is required on the same land.

179. The most consistently productive legume has been the variety Provence of *Medicago sativa*. The regrowth after grazing is rapid and its bushy growth habit has led to an easy association with both *Chloris gayana* and *Panicum maximum*.

180. Grazing records were started in June and already they show the value of swamp and elephant grass compared with the low-stock carrying capacity of the improved permanent pastures and short grass leys. Elephant grass will be used to replace *Chloris gayana* for the following reasons:—

(a) When planted in rows it can be kept clear of “lumbugu”.

(b) It provides high yields of nutritious herbage which is particularly valuable in the dry season.

(c) It is deep rooting and one of the most beneficial of all ley grasses for regenerating soil fertility.

181. Establishment of elephant grass is best achieved by mechanically ridging and planted overlapping stems along the furrow, three feet apart, covering being done by hand. Gap filling, in order to get a good stand, is essential if weeds are to be suppressed. Three foot rows fit in well with ox-cultivation. Hillers on the ox-cultivator were found useful when weeding the rows particularly in the early stages of establishment.

(ii) Pasture Agronomy at Serere

182. *Hyparrhenia rufa* and *Panicum maximum* have out-yielded other grasses in cutting trials and further trials are now concentrated on these species, together with *Chloris*. *Stylosanthes* is now considered the most promising legume. All three plants are palatable to stock and *Hyparrhenia* is able to withstand heavy grazing particularly well. A trial, both cut and grazed, demonstrated the continued spread of legumes as the ley grew older, and it showed that Giant *Chloris*, although yielding well initially, later falls to the production level of “local” *Chloris*. The gain in total fodder yield when a legume is included in a grass ley has been demonstrated; a crop of sorghum is now being grown to test the residual value of the legume.

183. Elephant grass has yielded 38 tons per acre green matter in its first year from five cuts. Nearly 2,000 beast-grazing days (between 08:00 and 16:00 hours) were obtained. The Kawanda varieties of this grass differ little among themselves, but the smooth type is the most palatable. The newly introduced “Cameroons” strain has greater promise.

184. The value of sulphate of ammonia on leys has again been clearly demonstrated. Its effect appears only in the cut immediately after application. *Panicum* appear to respond better than *Chloris*.

(iii) *Livestock*

185. At Kawanda drastic culling was continued throughout the year. The number of cattle was reduced from 175 to 131. The aim of the herd is to produce a good milking dual purpose animal and to supply heifers for a long-term Jersey-Nganda crossing programme.

186. At Serere three bulls have completed their progeny tests, and six more are still under test. Milk yields from the herd were higher than ever before (258 gallons per lactation, including 45 per cent used by the calf) and the liveweight gains, except for calves, were equal to, or better than, the previous averages. The total liveweight produced from the entire station was well up on previous figures, this is attributed to increased stock numbers and better utilization of available grazing.

187. Night paddocking, instead of night kraaling, has been found to be advantageous. Mean lightweight gains per beast over ten months were paddock 79 lb. and kraal 53 lb; greatest differences occurred when grass for day grazing was least.

188. In grazing trials with different grasses, "local" *Chloris* has shown up surprisingly well; *Cenchrus* and *Setaria* are inferior.

189. Preliminary indications are that legumes in the ley increase the liveweight gain. Gains per head per day with Giant *Chloris* alone, and with legumes, were 0.35 lb. and 0.47 lb. respectively, whilst with *Panicum maximum* alone and with legumes, the gains were 0.39 lb. and 0.53 lb, respectively.

190. The feeding trial concluded early this year shows that there are unlikely to be any long-term residual effects from the different rations fed.

191. At Ngetta Experimental Farm in Lango District, the original importations from Kyoga County were shown to be the best beef stock in the herd and superior to Serere stock.

(iv) *Farming Systems*

192. A memoir on the farming systems of Teso District was written during the year, which will serve as the pattern for other districts.

193. In order to gain some accurate costings of the operations likely to be undertaken by peasant farmers, a model small-holding was laid out at Kawanda. This consists of two acres of plantains interplanted with maize, two acres of Robusta coffee interplanted with beans (with another acre of coffee to be planted next year), half an acre of elephant grass for coffee mulching and another $1\frac{1}{2}$ acres for stall feeding. Hand labour only is used, with a maximum labour force of eight porters, which approximates to a family unit, plus permanent labour. A kraal for stall feeding up to four milch cows, and a deep litter house for 25 hens were erected centrally in the holding.

(f) Publications

194. Details of scientific papers published by members of the Department are shown in Appendix X.

VII. STAFF

195. The first African Agricultural Officer, Mr. G. R. W. Onaba, was appointed to the Department during the year having successfully completed his post-graduate training, whilst a second African officer, who had graduated with honours in Economics at Aberystwyth, took up his duties as Agricultural Officer (Economist). The establishment of Field Officers was increased to assist with the production drive and six new officers took up their duties during the year. Three Assistant Agricultural Officers were also appointed. Appointments to the Research Division included a Senior Chemist (to fill the vacancy caused by the promotion of Dr. E. M. Chenery to Chief Research Officer), a Plant Pathologist and Pasture Agronomist. By the end of the year, however, the staff position of the division had deteriorated considerably owing to the resignation of three Botanists, an Entomologist and a Chemist. At Bukalasa Farm Institute the staff was strengthened by the appointment of an Agricultural Officer (Teaching).

196. In April, the Department suffered a great loss by the departure on retirement, after 27 years' service in the Protectorate, of the Chief Research Officer, Mr. J. D. Jameson, O.B.E. Mr. Jameson made many important contributions to the development and improvement of both food and cash crops in Uganda, but he will be best remembered for the leading role he played in the breeding of the commercial cotton variety S.47, and for his work in devising a practical method of controlling the primary infection of blackarm disease by seed disinfection. Mr. Jameson was responsible for organising the rapid development of the Research Division as recommended by the Agricultural Productivity Committee. His wise counsel will be sadly missed by all concerned with agricultural development in the Protectorate.

VIII. ACKNOWLEDGMENTS

197. Once again it is my pleasure to acknowledge the help and co-operation which this Department has received during the year from both official and non-official bodies and from other departments of Government. My thanks are particularly due to members of the Cotton and Coffee Advisory Committees and to the Minister of Natural Resources and his staff. Finally, I would like to thank all members of my staff for their hard work and loyal support throughout the year.

J. G. M. KING,
Director of Agriculture.

ENTEBBE,

8TH APRIL, 1959.

UGANDA RAINFALL, 1958

Station	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
ABI (West Nile)	Total.ins. . .												
	Days . . .	0.34	4.84	7.57	8.24	6.66	4.40	5.16	7.42	7.06	3.93	1.76	57.88
	Mean.ins. . .	5	7	13	6	10	10	8	13	10	5	8	90
GULU	Total.ins. . .	0.82	4.06	5.73	5.86	5.31	6.27	8.57	7.66	7.60	4.27	1.72	59.14
	Days . . .	2.45	5.08	5.18	5.98	6.06	7.24	10.14	7.78	7.89	3.49	3.56	64.93
	Mean.ins. . .	5	11	15	18	12	13	22	18	20	9	10	154
LIRA	Total.ins. . .	1.69	3.37	6.91	7.86	5.72	6.59	8.93	6.84	6.45	3.70	1.82	60.34
	Days . . .	1.38	2.67	9.22	6.08	6.54	6.07	8.07	5.50	5.41	0.89	3.63	58.47
	Mean.ins. . .	3	9	13	14	18	11	18	14	14	5	8	133
MOROTO	Total.ins. . .	1.10	3.32	6.86	7.27	5.17	5.17	8.67	6.37	5.55	2.97	1.67	55.51
	Days . . .	3.16	2.72	3.06	3.68	8.86	6.11	3.78	1.61	1.98	0.00	0.78	36.81
	Mean.ins. . .	5	4	8	9	13	12	8	6	8	0	3	79
SERERE	Total.ins. . .	1.23	2.71	4.89	5.85	3.53	5.34	4.32	2.04	1.84	1.68	0.96	34.74
	Days . . .	2.84	3.61	9.10	7.71	3.78	2.48	4.86	3.76	4.35	1.98	3.81	50.14
	Mean.ins. . .	5	13	14	16	14	12	18	14	16	5	8	139
MBALE	Total.ins. . .	0.87	3.59	8.29	7.56	4.16	4.58	6.45	5.49	4.39	3.44	2.15	53.14
	Days . . .	1.35	7.83	2.20	4.34	5.35	5.43	3.80	1.43	2.78	0.75	1.30	38.40
	Mean.ins. . .	8	13	10	19	16	16	19	15	14	5	10	151
TORORO	Total.ins. . .	1.97	3.63	6.38	6.63	4.93	4.57	5.37	4.21	3.18	2.33	1.66	45.84
	Days . . .	2.58	5.53	6.45	11.44	4.11	3.08	1.38	5.22	4.91	1.24	2.85	49.90
	Mean.ins. . .	10	14	15	20	16	17	14	16	16	9	14	166
JINJA	Total.ins. . .	2.59	5.44	8.55	8.54	4.16	7.04	4.58	3.94	4.61	3.74	2.89	55.02
	Days . . .	3.57	3.64	7.87	2.30	2.23	1.50	1.78	2.51	3.61	3.58	3.99	39.18
	Mean.ins. . .	7	15	11	9	12	9	8	12	13	8	14	129
KABALE	Total.ins. . .	2.10	3.56	7.85	5.43	2.19	1.92	3.67	2.63	3.33	3.33	4.00	43.59
	Days . . .	5.17	3.70	6.46	4.88	0.29	0.40	3.94	1.54	3.64	5.95	8.94	48.60
	Mean.ins. . .	12	16	17	15	3	4	9	8	16	17	20	153
MBARARA	Total.ins. . .	3.60	4.63	5.41	3.78	1.07	0.85	2.13	3.72	3.82	4.12	3.56	39.02
	Days . . .	1.62	5.06	5.05	4.87	0.19	1.33	1.25	2.07	5.57	1.49	4.40	35.27
	Mean.ins. . .	9	17	18	9	5	4	13	16	19	15	22	152
		2.40	3.84	4.81	3.19	1.02	0.88	2.47	3.87	4.09	4.42	2.97	35.56

FORT PORTAL	Total.ins. . .	0.66	0.96	5.22	6.42	6.36	2.65	3.10	4.79	5.53	8.18	3.73	4.68	52.28
	Days	8	5	14	18	12	12	9	18	17	23	22	16	174
	Mean.ins. . .	1.30	2.84	5.34	7.31	5.61	3.24	2.33	4.61	7.41	8.40	6.31	3.04	57.74
BULINDI	Total.ins. . .	1.26	1.55	4.01	6.13	4.35	1.08	4.13	9.05	3.62	5.15	3.82	4.80	48.05
	Days	8	4	13	9	10	8	9	16	14	15	6	12	124
	Mean.ins. . .	1.33	2.36	4.15	7.09	5.23	3.49	3.55	5.89	6.31	4.93	3.68	2.28	50.29
MASAKA	Total.ins. . .	2.54	0.60	4.00	6.02	6.38	3.09	0.52	1.12	2.57	3.22	2.23	5.29	37.58
	Days	8	4	11	13	12	10	4	9	8	8	6	13	106
	Mean.ins. . .	2.04	2.36	4.42	7.01	6.71	1.76	1.37	2.11	3.43	3.87	3.73	3.53	42.34
KARUMIRO	Total.ins. . .	0.55	2.13	3.99	6.74	4.46	1.23	1.25	4.61	6.00	6.91	3.28	3.37	44.52
	Days	2	4	11	11	10	6	9	10	13	14	13	9	112
	Mean.ins. . .	1.37	2.27	4.40	6.63	4.17	2.78	2.84	5.34	6.70	7.10	5.31	2.81	51.72
MITYANA	Total.ins. . .	1.43	2.99	3.42	7.38	4.32	1.80	2.21	3.41	4.89	2.71	2.76	5.08	42.40
	Days	6	3	9	18	13	7	5	12	8	15	10	11	115
	Mean.ins. . .	1.99	2.53	4.42	6.44	4.68	2.26	1.81	3.90	4.45	5.56	4.34	3.20	45.58
KAMPALA	Total.ins. . .	1.70	2.60	6.18	6.65	3.71	2.74	2.94	3.44	4.60	2.91	3.58	5.01	46.06
	Days	6	7	12	15	10	10	5	11	8	10	10	11	115
	Mean.ins. . .	2.27	2.21	3.79	6.47	5.86	2.56	2.35	4.20	3.84	3.85	4.60	3.38	45.38
ENTEBBE	Total.ins. . .	4.24	1.88	4.99	9.66	18.24	10.38	1.63	1.09	2.84	0.88	1.88	8.14	65.85
	Days	14	10	12	22	16	18	11	9	8	6	11	23	160
	Mean.ins. . .	4.27	3.19	6.02	11.05	11.20	4.20	2.51	3.39	3.10	3.32	5.29	5.38	62.92

COTTON PRODUCTION, 1957/58 SEASON

Province and Zone	Acreages		Sales in Tons (Seed Cotton)		Yields per Acre (Seed Cotton)	
	Totals	Means	Totals	Means	Totals	Means
	1957/58	1952/53- 1956/57	1957/58	1952/53- 1956/57	1957/58	1952/53- 1956/57
BUGANDA—					<i>lb.</i>	<i>lb.</i>
Mengo	244,487	292,056	43,049	51,689	394	397
Masaka	35,687	30,374	3,641	4,458	229	329
Mubende	68,109	55,817	11,763	9,456	387	379
TOTALS ..	348,283	378,247	58,453	65,603	376	389
WESTERN—						
Bunyoro	43,570	27,515	4,769	4,825	245	393
Toro	34,100	28,818	4,661	3,151	306	244
TOTALS ..	77,670	56,333	9,430	7,976	272	317
EASTERN—						
Busoga	339,971	337,619	49,828	51,630	328	343
Mbale	323,225	332,000	32,666	31,359	226	211
South Teso ..	53,331	62,038	5,175	5,693	217	206
South Teso Segregated	43,250	36,853	3,830	4,534	198	276
North Teso ..	60,395	57,548	5,017	4,962	186	193
Usuku	18,441	15,716	1,269	2,019	154	288
TOTALS ..	838,613*	841,774	97,785†	100,197	261	267
NORTHERN—						
Lango	193,150	167,764	18,208	15,708	211	210
East Acholi and Kara- moja	59,928	47,211	8,007	4,870	299	231
West Acholi ..	46,422	38,318	8,255	5,588	398	327
West Nile	52,947	65,678	7,927	7,009	335	239
TOTALS ..	352,447*	318,971	42,397†	33,175	269	233
PROTECTORATE TOTALS ..	1,617,013	1,595,325	208,065	206,951	288	291

* These figures do not agree with provincial totals as shown in Tables III (a), III (c) and III (e) due to the fact that the boundaries of zones listed under Eastern and Northern Provinces do not coincide with provincial boundaries. The differences are compensating and the Protectorate totals in Tables II (a) and III (a) agree.

† Similarly these figures do not agree with those in Table IV (a) the Protectorate totals, however, agree.

COTTON PRODUCTION, 1958/59 SEASON

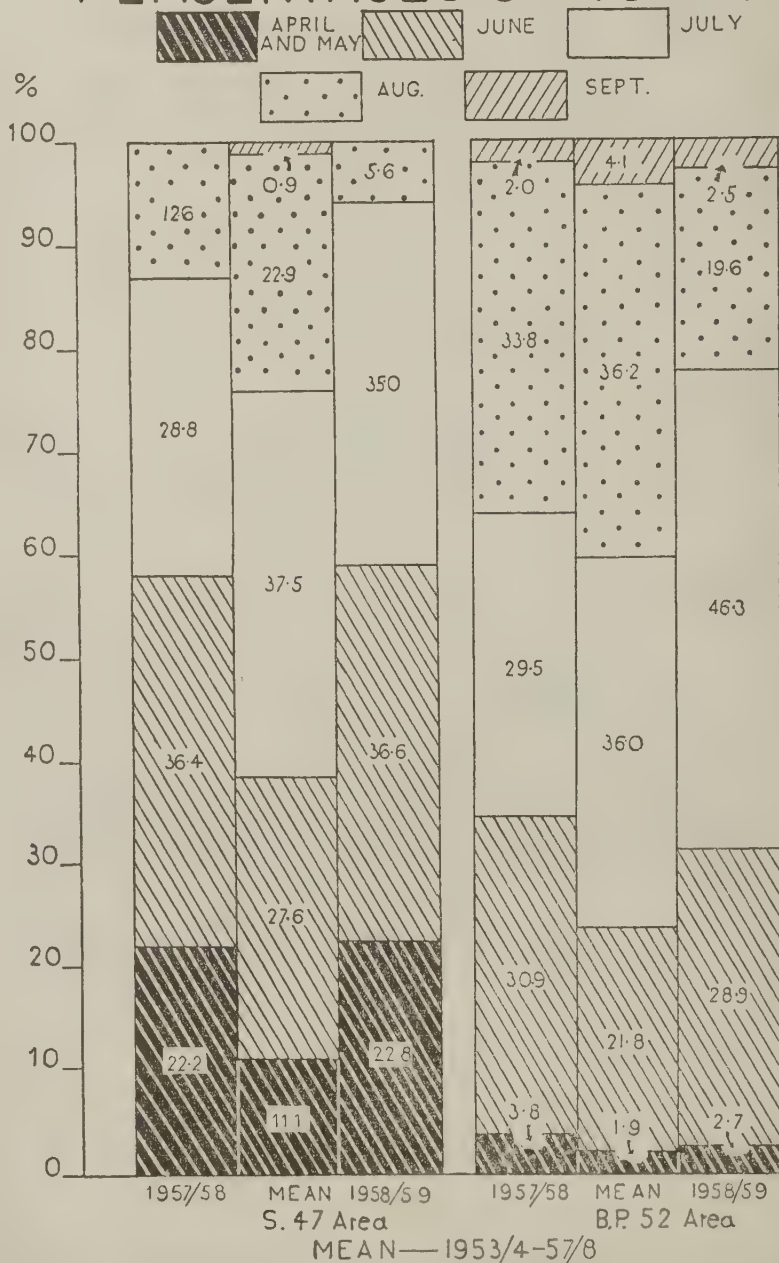
(Monthly Plantings—Acres)

Province and Zone	April	May	June	July	Aug.	Sept.	TOTAL
BUGANDA— ..							
Mengo ..	—	2,230	99,749	136,972	30,658	1,896	271,505
Masaka ..	—	4,728	11,064	8,626	8,347	7,333	40,098
Mubende ..	—	2,570	14,801	37,658	15,943	1,452	72,424
TOTAL ..	—	9,528	125,614	183,256	54,948	10,681	384,027
WESTERN— ..							
Bunyoro ..	—	3,224	10,926	27,685	13,609	—	55,444
Toro ..	—	—	378	8,484	24,615	1,355	34,832
TOTAL ..	—	3,224	11,304	36,169	38,224	1,355	90,276
EASTERN— ..							
Busoga ..	4,568	120,678	149,722	156,946	20,668	—	452,582
Mbale ..	6,852	77,929	156,172	154,961	21,333	—	417,247
South Teso ..	4,168	28,447	22,389	18,026	2,920	—	75,950
South Teso Segre- gated ..	1,304	15,452	17,601	14,932	1,771	—	51,060
North Teso ..	1,990	22,472	30,136	21,782	1,924	—	78,304
Usuku ..	2,537	13,686	7,219	876	2	—	24,320
TOTAL ..	21,419	278,664	383,239	367,523	48,618	—	1,099,463*
NORTHERN— ..							
Lango ..	1,686	30,858	102,800	87,560	10,272	—	233,176
East Acholi and Karamoja ..	204	13,313	31,994	24,350	7,621	—	77,482
West Acholi ..	—	3,510	24,474	28,611	6,597	—	63,192
West Nile ..	—	1,025	20,610	31,751	12,993	25	66,404
TOTAL ..	1,890	48,706	179,878	172,272	37,483	25	440,254*
PROTECTORATE TOTAL ..	23,309	340,122	700,035	759,220	179,273	12,061	2,014,020

* These figures do not agree with those in Tables III (a) and III (e) due to the fact that the boundaries of the zones listed under Eastern and Northern Provinces do not coincide with the provincial boundaries. The differences are compensating; the Protectorate totals agree.

COTTON.

MONTHLY PLANTINGS AS PERCENTAGES OF TOTAL



COTTON—MONTHLY PLANTINGS AS PERCENTAGES OF TOTAL

PROVINCE AND ZONE	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
	1958/59	Mean 1953/54- 1957/58	1958/59	Mean 1953/54- 1957/58	1958/59	Mean 1953/54- 1957/58	1958/59	Mean 1953/54- 1957/58	1958/59	Mean 1953/54- 1957/58	1958/59	Mean 1953/54- 1957/58
<i>Buganda</i> —												
Mengo ..	—	0.8	0.8	0.9	36.8	24.0	50.4	40.2	11.3	33.4	0.7	1.5
Masaka ..	—	11.8	11.8	9.4	27.6	24.5	21.5	17.9	20.8	32.0	18.3	16.2
Mubende ..	—	3.6	3.6	2.4	20.4	20.5	52.0	34.0	22.0	40.5	2.0	2.6
TOTAL ..	—	2.5	2.5	1.8	32.7	23.5	47.7	37.4	14.3	34.4	2.8	2.9
<i>Western</i> —												
Bunyoro ..	—	5.8	5.8	4.1	19.7	21.9	50.0	43.5	24.5	30.4	—	0.1
Toro ..	—	—	—	—	1.1	0.1	24.3	11.3	70.7	64.6	3.9	24.0
TOTAL ..	—	3.6	3.6	2.1	12.5	11.2	40.1	27.7	42.3	47.2	1.5	11.8
<i>Eastern</i> —												
Busoga ..	1.0	26.7	26.7	12.0	33.1	26.8	34.7	36.0	4.5	23.3	—	1.8
Mbale ..	1.7	18.7	18.7	8.1	37.4	26.1	37.1	38.6	5.1	26.0	—	0.7
South Teso ..	5.5	37.5	37.5	22.5	29.5	31.6	23.7	27.6	3.8	15.1	—	0.6
South Teso Segregated ..	2.6	30.3	30.3	19.7	34.4	29.4	29.2	26.6	3.5	21.4	—	0.6
North Teso ..	2.5	28.7	28.7	22.0	38.5	34.2	27.8	30.2	2.5	12.5	—	—
Usuku ..	10.4	56.3	56.3	52.1	29.7	33.0	3.6	10.6	—	0.3	—	—
TOTAL ..	1.9	25.4	25.4	13.0	34.9	27.6	33.4	35.2	4.4	22.5	—	1.1
<i>Northern</i> —												
Lango ..	0.7	13.2	13.2	5.1	44.1	29.6	37.6	42.7	4.4	21.7	—	0.4
East Acholi and Karamoja ..	0.3	17.2	17.2	8.4	41.3	29.0	31.4	43.7	9.8	18.8	—	—
West Acholi ..	—	5.6	5.6	2.5	38.7	28.2	45.3	45.8	10.4	22.5	—	1.0
West Nile ..	—	1.6	1.6	0.2	31.0	20.3	47.8	43.7	19.6	35.5	—	0.3
TOTAL ..	0.4	11.1	11.1	4.4	40.9	27.5	39.1	43.4	8.5	24.0	—	0.4
PROTECTORATE TOTAL ..	1.1	16.9	16.9	8.2	34.8	26.0	37.7	37.1	8.9	26.5	0.6	1.8

COTTON PRODUCTION

(Number of Bales of 400 lb., 1907-1958)

(Note:— All figures are corrected to 1,000 bales).

Season			Bales (5-year average)	Season			Bales (5-year average)
Season			Bales (Actual)	Season			Bales (Actual)
1907	..	..	2,000	—	1933-34	..	286,000
1908	..	..	4,000	—	1934-35	..	253,000
1909	..	..	5,000	9,000	1935-36	..	316,000
1910	..	..	12,000	13,000	1936-37	..	332,000
1911	..	..	20,000	21,000	1937-38	..	418,000
1912-13	..	..	26,000	25,000	1938-39	..	307,000
1913-14	..	..	40,000	27,000	1939-40	..	300,000
1914-15	..	..	26,000	28,000	1940-41	..	365,000
1915-16	..	..	22,000	29,000	1941-42	..	238,000
1916-17	..	..	28,000	26,000	1942-43	..	112,000
1917-18	..	..	27,000	30,000	1943-44	..	191,000
1918-19	..	..	36,000	44,000	1944-45	..	272,000
1919-20	..	..	47,000	48,000	1945-46	..	227,000
1920-21	..	..	81,000	60,000	1946-47	..	231,000
1921-22	..	..	48,000	78,000	1947-48	..	170,000
1922-23	..	..	88,000	108,000	1948-49	..	391,000
1923-24	..	..	128,000	128,000	1949-50	..	339,000
1924-25	..	..	196,000	145,000	1950-51	..	346,000
1925-26	..	..	180,000	155,000	1951-52	..	380,000
1926-27	..	..	131,000	170,000	1952-53	..	320,000
1927-28	..	..	138,000	156,000	1953-54	..	398,000
1928-29	..	..	204,000	157,000	1954-55	..	300,000
1929-30	..	..	125,000	173,000	1955-56	..	364,000
1930-31	..	..	189,000	204,000	1956-57	..	372,000
1931-32	..	..	207,000	220,000	1957-58	..	351,000
1932-33	..	..	295,000	246,000	—	..	—

COTTON PRODUCTION
(Bales of Lint)

Province/Zone	1952/53	1953/54	1954/55	1955/56	1956/57	Mean 1952/53- 1956/57	1957/58
BUGANDA—							
Mengo ..	80,571	108,230	78,504	79,827	89,677	87,362	71,795
Masaka ..	7,450	8,797	6,355	8,072	7,003	7,535	6,012
Mubende ..	13,513	19,498	13,651	17,718	15,913	16,059	19,968
TOTAL ..	101,534	136,525	98,510	105,617	112,593	110,956	97,775
WESTERN—							
Bunyoro ..	7,237	9,519	7,338	9,069	7,894	8,211	7,959
Toro ..	4,040	5,629	4,027	5,074	8,229	5,400	8,025
TOTAL ..	11,277	15,148	11,365	14,143	16,123	13,611	15,984
TOTAL B.P. 52 ..	112,811	151,673	109,875	119,760	128,716	124,567	113,759
EASTERN—							
Busoga ..	79,049	93,368	62,897	93,665	107,840	87,364	84,270
Mbale ..	51,527	67,688	45,381	51,366	48,711	52,934	54,949
South Teso ..	10,658	8,652	8,602	9,804	10,525	9,648	8,833
South Teso Segre- gated ..	7,747	7,478	5,895	8,101	8,597	7,564	6,496
North Teso ..	9,245	6,767	9,494	7,254	9,063	8,365	8,557
Usuku ..	4,584	2,826	3,916	2,727	2,975	3,405	2,145
TOTAL ..	162,810	186,779	136,185	172,917	187,711	169,280	165,250
NORTHERN—							
Lango ..	23,035	28,870	25,948	30,865	26,589	27,062	30,743
East Acholi and Karamoja ..	5,786	6,243	7,457	13,501	8,788	8,355	13,842
West Acholi ..	7,408	9,558	11,345	10,621	8,614	9,509	14,130
West Nile ..	8,142	14,471	9,021	15,785	11,767	11,837	12,969
TOTAL ..	44,371	59,142	53,771	70,772	55,758	56,763	71,684
TOTAL S. 47 ..	207,181	245,921	189,956	243,689	243,469	226,043	236,934
PROTECTORATE TOTAL ..	319,992	397,594	299,831	363,449	372,185	350,610	350,693

All figures exclude production by research and experiment stations.

CROP PRODUCTION Estimated Acreages under Crops, 1957 and 1958—African Cultivation

Crop	BUGANDA		EASTERN		NORTHERN		WESTERN		TOTAL	
	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958
Bambara Nuts	..	..	427	438	..	..	..	..	427	438
Beans, Mixed	128,549	124,548	147,468	141,220	..	..	119,206	138,244	508,494	526,002
Beans, Soya	268	2,673	..	..	113,271	..	943	96	1,211	2,769
Cassava	46,154	52,756	215,040	262,921	161,168	209,577	106,070	142,276	528,432	667,530
Chillies	..	..	..	..	..	..	22	11	22	11
Coffee, Arabica	1,007	1,607	19,950	23,906	835	884	6,987	7,479	28,779	33,876
Coffee, Robusta	384,663	416,730	6,779	6,990	101	220	11,282	12,541	402,825	436,481
Cotton	348,283	384,027	875,126	1,129,401	315,934	410,316	77,670	90,276	1,617,013	2,014,020
Gram	7,142	7,635	2,224	1,537	303	1,011	17	5	9,686	10,188
Groundnuts	87,468	85,186	216,884	238,888	79,831	96,441	26,354	26,820	410,537	447,335
Maize	138,781	97,278	123,238	147,762	46,758	48,246	49,467	46,899	358,244	340,185
Millet, Sorghum	52,804	46,077	139,034	174,299	318,896	258,315	173,212	203,672	683,946	682,363
Millet, Finger	27,102	22,444	729,641	787,638	272,246	295,079	123,256	112,843	1,152,245	1,218,004
Millet, Bulrush	..	..	747	166	3,943	5,294	..	..	4,690	5,460
Onions	..	..	..	..	..	..	3,538	814	3,538	814
Peas, Pigeon	..	..	1,565	1,307	155,777	162,847	387	533	157,729	164,687
Peas, Field	..	..	..	..	..	..	30,059	31,246	30,059	31,246
Plantains	463,699	497,933	439,589	452,188	8,690	3,266	378,611	386,511	1,290,589	1,339,898
Potatoes, Sweet	109,234	100,852	163,053	205,410	77,202	82,249	179,819	174,177	529,308	562,688
Potatoes, Solanum	270	..	1,873	942	..	..	12,368	10,208	14,511	11,150
Rice	..	..	684	4,501	1,101	1,079	44	87	1,829	5,667
Simsim	3,162	7,285	27,470	17,819	193,474	214,243	3,571	5,223	227,677	244,570
Sunflower	..	..	..	..	16	40	9	5	25	45
Sunn-Hemp	..	..	108	202	..	..	..	..	108	202
Tobacco, Flue-cured	..	..	..	..	3,229	3,482	543	517	3,772	3,999
Tobacco, Fire-cured	931	1,665	9	6	..	..	5,044	5,975	5,984	7,646
Tobacco, Air-cured	440	231	..	..	1,078	1,415	..	615	1,518	2,261
Wheat	..	..	..	..	..	..	380	380	393	601
Yams	..	..	233	53	..	..	..	..	233	53
TOTAL	1,799,957	1,848,927	3,111,155	3,597,815	1,753,853	1,915,994	1,308,859	1,397,453	7,973,824	8,760,189

CROP PRODUCTION

Estimated Acreages under Crops, 1957 and 1958—African Cultivation

BUGANDA PROVINCE

CROP	MENGO		MASAKA		MUBENDE		PROVINCIAL TOTAL	
	1957	1958	1957	1958	1957	1958	1957	1958
Beans, Mixed	77,386	71,869	33,462	37,698	17,701	14,981	128,549	124,548
Beans, Soya	268	2,673	—	—	—	—	268	2,673
Cassava ..	32,507	31,924	5,427	6,607	8,220	14,225	46,154	52,756
Chillies ..	—	—	—	—	—	—	—	—
Coffee, Arabica	—	600	1,007	1,007	—	—	1,007	1,607
Coffee, Robusta	295,516	316,762	80,042	88,042	9,105	11,926	384,663	416,730
Cotton ..	291,733	315,762	35,687	40,098	20,863	28,167	348,283	384,027
Gram ..	1,322	5,366	3,667	553	2,153	1,716	7,142	7,635
Groundnuts	61,520	61,184	17,483	16,219	8,465	7,783	87,468	85,186
Maize ..	111,818	79,298	20,772	13,169	6,191	4,811	138,781	97,278
Millet, Sorghum	30,329	27,149	15,750	14,729	6,725	4,199	52,804	46,077
Millet, Finger	18,037	16,036	2,720	1,174	6,345	5,234	27,102	22,444
Plantains ..	296,749	320,609	142,090	150,543	24,860	26,781	463,699	497,933
Potatoes, Sweet	87,164	68,713	12,127	16,982	9,943	15,157	109,234	100,852
Potatoes, Solanum	270	—	—	—	—	—	270	—
Simsim ..	2,248	6,258	—	—	914	1,027	3,162	7,285
Tobacco, Fire-cured	—	—	—	—	931	1,665	931	1,665
Tobacco, Air-cured	—	—	—	—	440	231	440	231
TOTAL ..	1,306,867	1,324,203	370,234	386,821	122,856	137,903	1,799,957	1,848,927

CROP PRODUCTION

Estimated Acreages under Crops, 1957 and 1958—African Cultivation

EASTERN PROVINCE

CROP	BUSOGA		BUKEDI		BUGISU		TESO		PROVINCIAL TOTAL	
	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958
Bambara Nurs	..	..	..	..	..	..	427	438	427	438
Beans, Mixed	..	25,444	..	42,181	..	..	57,188	57,209	147,468	141,220
Cassava	..	44,094	..	56,121	..	..	96,982	78,330	215,040	262,921
Coffee, Arabica	..	..	..	..	..	..	3	6	19,950	23,906
Coffee, Robusta	..	6,779	..	..	..	..	..	..	6,779	6,990
Cotton	..	339,971	..	207,212	..	..	263,909	323,301	875,126	1,129,401
Gram	..	..	..	..	..	..	2,224	1,537	2,224	1,537
Groundnuts	..	67,225	..	46,473	..	..	93,890	92,420	216,884	238,888
Maize	..	54,278	..	22,195	..	..	8,866	7,311	123,238	147,762
Millet, Sorghum	..	1,010	..	18,111	..	..	111,266	134,858	139,034	174,299
Millet, Finger	..	155,410	..	184,652	..	..	328,984	356,236	729,641	787,638
Millet, Bulrush	..	..	..	..	..	..	747	166	747	166
Peas, Pigeon	..	..	..	..	..	..	1,565	1,307	1,565	1,307
Plantains	..	184,886	..	52,000	..	..	2,703	2,788	439,589	452,188
Potatoes, Sweet	..	71,185	..	26,238	..	..	52,818	63,181	163,053	205,410
Potatoes, Solanum	..	..	..	..	..	..	..	..	1,873	942
Rice	..	29	..	391	..	..	264	160	684	4,501
Simsim	..	1,667	..	825	..	..	24,930	14,953	27,470	17,819
Sunn-Hemp	..	..	..	..	..	..	108	202	108	202
Tobacco, Fire-cured	..	..	..	..	..	..	9	6	9	6
Wheat	..	..	..	..	..	..	..	..	13	221
Yams	..	..	..	..	..	..	233	53	233	53
TOTAL	951,978	1,079,989	656,399	853,664	455,662	529,700	1,047,116	1,134,462	3,111,155	3,597,815

CROP PRODUCTION

Estimated Acreages under Crops, 1957 and 1958—African Cultivation

WESTERN PROVINCE

CROP	ANKOLE		BUNYORO		KICEZI		TORO		TOTAL	
	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958
Beans, Mixed	21,312	18,914	8,635	11,547	56,620	57,771	32,639	50,012	119,206	138,244
Beans, Soya	893	—	—	—	—	—	50	96	943	96
Cassava	8,727	13,370	42,336	42,626	3,081	2,690	51,926	83,590	106,070	142,276
Chillies	—	—	—	—	11	11	—	—	22	11
Coffee, Arabica	2,515	2,685	—	—	338	582	4,134	4,212	6,987	7,479
Coffee, Robusta	5,388	5,888	1,165	1,242	443	953	4,286	4,458	11,282	12,541
Cotton	—	—	43,570	55,444	—	—	34,100	34,832	77,670	90,276
Gram	—	—	—	—	—	—	17	5	17	5
Groundnuts	7,898	7,272	6,384	9,454	4,714	4,253	7,358	5,841	26,354	26,820
Maize	4,343	5,127	5,981	5,633	26,487	25,835	12,656	10,304	49,467	46,899
Millet, Sorghum	14,658	48,006	946	935	152,954	149,492	6,654	5,239	173,212	203,672
Millet, Finger	16,247	14,748	16,257	16,373	67,308	69,201	23,444	12,521	123,256	112,843
Onions	821	104	342	260	2,267	310	108	140	3,538	814
Peas, Field	6,698	4,863	—	—	23,313	26,326	48	57	30,059	31,246
Peas, Pigeon	—	—	387	533	—	—	—	—	387	533
Plantains	272,643	280,643	19,409	19,518	72,664	72,317	13,895	14,033	378,611	386,511
Potatoes, Sweet	28,996	26,708	13,137	13,677	123,686	119,743	14,000	14,049	179,819	174,177
Potatoes, Solanum	77	132	20	17	11,900	9,873	371	186	12,368	10,208
Rice	—	—	—	—	1	—	43	87	44	87
Simsim	2	2	3,561	5,221	—	—	8	—	3,571	5,223
Sunflower	—	—	—	—	9	5	—	—	9	5
Tobacco, Air-cured	—	92	—	—	—	523	—	—	—	615
Tobacco, Fire-cured	—	—	5,044	5,975	—	—	—	—	5,044	5,975
Tobacco, Flue-cured	—	—	—	—	543	517	—	—	543	517
Wheat	—	—	—	—	271	268	109	112	380	380
TOTAL	391,218	428,554	167,174	188,455	546,610	540,670	203,857	239,774	1,308,859	1,397,453

CROP PRODUCTION
Estimated Acreages under Crops, 1957 and 1958—African Cultivation
NORTHERN PROVINCE

CROP	LANGO		ACHOLI		WEST NILE/MADI		KARAMOJA		TOTAL	
	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958
Beans, Mixed ..	28,858	39,050	9,489	31,081	74,924	51,859	—	—	113,271	121,990
Cassava ..	43,952	62,301	31,596	34,608	85,465	112,513	155	155	161,168	209,577
Coffee, Arabica ..	—	—	—	—	835	884	—	—	835	884
Coffee, Robusta ..	—	—	—	—	101	220	—	—	101	220
Cotton ..	167,483	214,817	94,676	127,663	52,947	66,404	828	1,432	315,934	410,316
Gram ..	—	—	—	—	303	1,011	—	—	303	1,011
Groundnuts ..	35,055	33,012	23,065	31,895	19,879	29,702	1,832	1,832	79,831	96,441
Maize ..	4,949	6,889	3,025	6,501	32,980	28,756	5,804	6,100	46,758	48,246
Millet, Sorghum ..	150,764	86,573	47,588	56,790	19,356	13,764	101,188	101,188	318,896	258,315
Millet, Finger ..	132,904*	124,188*	68,935	106,629	66,690	60,512	3,717	3,750	272,246	295,079
Millet, Bulrush ..	—	—	413	1,584	—	—	3,530	3,710	3,943	5,294
Peas, Pigeon ..	132,904*	124,188*	19,593	31,019	3,174	7,116	106	524	155,777	162,847
Plantains ..	691	1,185	—	—	7,999	2,081	—	—	8,690	3,266
Potatoes, Sweet ..	24,381	41,417	11,689	20,636	41,033	20,086	99	110	77,202	82,249
Rice ..	478	374	—	—	623	705	—	—	1,101	1,079
Simsim ..	84,071	83,109	58,189	95,540	50,521	34,924	693	670	193,474	214,243
Sunflower ..	—	—	—	—	16	40	—	—	16	40
Tobacco, Air-cured ..	—	—	—	—	1,078	1,415	—	—	1,078	1,415
Tobacco, Flue-cured ..	7	11	1,041	1,295	2,181	2,176	—	—	3,229	3,482
Total ..	806,497	817,114	369,299	545,241	460,105	434,168	117,952	119,471	1,753,853	1,915,994

* Interplanted.

CROP PRODUCTION
Quantities Marketed and Estimated Values (African Production)
(Values Based on Prices Paid to Growers)

Province/District	Coffee*	Seed Cotton		Tobacco—Flue-cured (cured leaf)		Tobacco—Flue-cured (green leaf)		Tobacco—Air-cured (cured leaf)		Tobacco—Fire-cured (cured leaf)		TOTAL VALUE	
	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	1958	1957
	£	Tons	£	Tons	£	Tons	£	Tons	£	Tons	£	£	£
<i>Eastern—</i>													
Busoga	51,892	49,828	3,006,305	—	—	—	—	—	—	—	—	3,058,197	3,756,284
Bugisu	1,208,906	6,401	392,646	—	—	—	—	—	—	—	—	1,601,552	1,699,747
Bukedi	—	22,779	1,358,681	—	—	—	—	—	—	—	—	1,358,681	1,074,231
Teso	—	21,500	1,310,036	—	—	—	—	—	—	—	—	1,310,036	1,536,422
TOTAL ..	1,260,798	100,508	6,067,668	—	—	—	—	—	—	—	—	7,328,466	8,066,684
<i>Northern—</i>													
Lango	—	16,127	1,013,282	1	327	—	—	—	—	—	—	1,013,609	838,855
Acholi	—	15,472	966,211	23	6,371	1,648	18,058	—	—	—	—	990,640	568,390
Karamoja	—	148	9,408	—	—	—	—	—	—	—	—	9,408	10,418
West Nile/Madi	3,336	7,927	484,591	7	1,592	3,757	43,146	433	51,546	—	—	584,211	467,633
TOTAL ..	3,336	39,674	2,473,492	31	8,290	5,405	61,204	433	51,546	—	—	2,597,868	1,885,296
<i>Western—</i>													
Bunyoro	9,075	4,769	291,247	—	—	—	—	—	—	1,275	155,515	455,837	430,948
Toro	183,586	4,661	293,666	—	—	—	—	—	—	—	—	477,252	463,519
Kigezi	8,212	—	—	—	—	501	4,752	—	—	—	—	12,964	21,224
Ankole	393,625	—	—	—	—	—	—	—	—	—	—	393,625	194,902
TOTAL ..	594,498	9,430	584,913	—	—	501	4,752	—	—	1,275	155,515	1,339,678	1,110,593
<i>Buganda—</i>													
Mengo	6,987,084	51,209	3,229,930	—	—	—	—	—	—	—	—	10,217,014	9,271,917
Masaka	2,835,907	3,641	212,126	—	—	—	—	—	—	—	—	3,048,033	3,223,932
Mubende	132,586	3,603	224,221	—	—	—	—	49	5,823	355	42,912	405,542	378,292
TOTAL ..	9,955,577	58,453	3,666,277	—	—	—	—	49	5,823	355	42,912	13,670,589	12,874,141
PROTECTORATE TOTAL ..	11,814,209	208,065	12,792,350	31	8,290	5,906	65,956	482	57,369	1,630	198,427	24,936,601	23,936,714

* For details of types of production and tonnages see Appendix IV (b).

NOTE.—Crops included in this table are those for which quantities marketed and estimated values are known with accuracy. Crops such as maize, groundnuts, etc., of which considerable quantities are marketed are not included as reliable estimates of quantities and value are not available. All figures in this table given to nearest ton and £.

COFFEE PRODUCTION
Quantities Marketed and Estimated Values
(Values Based on Prices Paid to Growers)
For the Year 1958

PROVINCE/DISTRICT	ARABICA												TOTAL VALUE
	Parchment		Rough-hulled		Dried Cherry		Rough-hulled		Dried Cherry		Clean		
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
	Tons	£	Tons	£	Tons	£	Tons	£	Tons	£	Tons	£	£
Eastern—													
Busoga	—	—	—	—	—	—	—	—	594	51,892	—	—	51,892
Bugisu	4,805	1,198,602	—	—	184	10,304	—	—	—	—	—	—	1,208,906
Bukedi	—	—	—	—	—	—	—	—	—	—	—	—	—
Teso	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL ..	4,805	1,198,602	—	—	184	10,304	—	—	594	51,892	—	—	1,260,798
Northern—													
Lango	—	—	—	—	—	—	—	—	—	—	—	—	—
Acholi	—	—	—	—	—	—	—	—	—	—	—	—	—
Karamoja ..	—	—	—	—	—	—	—	—	—	—	—	—	—
West Nile ..	—	—	14	3,105	2	231	—	—	—	—	—	—	3,336
TOTAL ..	—	—	14	3,105	2	231	—	—	—	—	—	—	3,336
Western—													
Bunyoro ..	—	—	—	—	1	81	1	83	102	8,911	—	—	9,075
Toro	—	—	207	46,124	—	—	818	137,462	—	—	—	—	183,586
Kigezi	—	—	13	2,883	—	—	—	—	61	5,329	—	—	8,212
Ankole	—	—	170	37,693	687	79,241	40	6,667	3,091	270,024	—	—	393,625
TOTAL ..	—	—	390	86,700	688	79,322	859	144,212	3,254	284,264	—	—	594,498
Buganda—													
Mengo	—	—	276	61,151	257	29,663	678	112,426	76,373	6,671,934	662	111,910	6,987,084
Masaka	—	—	13	2,774	284	32,715	34	5,667	28,783	2,514,482	1,642	280,269	2,835,907
Mubende ..	—	—	5	1,109	81	9,344	1	227	1,395	121,906	—	—	132,586
TOTAL ..	—	—	294	65,034	622	71,722	713	118,320	106,551	9,308,322	2,304	392,179	9,955,577
PROTECTORATE TOTAL ..	4,805	1,198,602	698	154,839	1,496	161,579	1,572	262,532	110,399	9,644,478	2,304	392,179	11,814,209

All figures in this table given to nearest ton and £.

OVERSEAS EXPORTS OF AGRICULTURAL PRODUCE—1958

ARTICLE	UNIT	QUANTITIES			VALUE IN £		
		1956	1957	1958	1956	1957	1958
<i>Oilseeds and Products :</i>							
Cotton Seed ..	Tons	14,604	1,396	402	379,228	36,677	7,547
Castor Seed ..	Tons	1,844	1,757	2,614	105,251	113,941	119,118
Groundnuts ..	Tons	8,784	11,330	7,370	527,641	680,298	343,102
Sesame Seed ..	Tons	86	484	554	5,755	33,517	40,819
Sunflower Seed ..	Tons	117	165	172	4,161	6,550	5,073
Cotton Seed Cake ..	Tons	58,635	52,293	65,154	1,537,379	1,229,178	1,065,989
Cotton Seed Oil ..	Tons	2,447	3,710	2,097	278,043	432,722	238,635
Groundnut Oil ..	Tons	76	534	34	9,326	66,683	3,873
Other Vegetable Oils ..	Tons	2	1	2	329	140	238
Other Oilseed Cake, Meals and other Vegetable Oil Residues ..	Tons	1,386	249	923	45,158	7,020	22,688
<i>Fibres :</i>							
Cotton, Raw ..	Tons	67,214	60,149	69,199	19,284,591	17,476,282	18,141,400
Sisal ..	Tons	634	361	394	39,902	19,854	22,550
Flax ..	Tons	34	—	—	2,868	—	—
<i>Beverage Crops and Tobacco :</i>							
Coffee, not roasted ..	Tons	61,646	84,029	78,692	15,720,611	21,586,756	20,827,270
Tea ..	Tons	2,403	2,734	2,673	891,460	1,080,908	979,210
Unmanufactured Tobacco ..	Tons	—	33	4	—	5,600	820
Cigarettes ..	Lb.	106,659	129,671	104,192	10,155	24,319	27,044
<i>Spices and Drugs :</i>							
Chillies ..	Tons	200	244	201	48,264	44,063	31,017
Cinchona Bark ..	Tons	4	1	—	486	186	—
Papain ..	Tons	10	4	7	18,752	8,784	18,839
Vanilla ..	Tons	2	2	2	6,639	6,507	5,011
<i>Beans and Pulses :</i>							
Soya Beans ..	Tons	331	437	670	12,092	16,933	23,679
Others ..	Tons	112	105	342	4,977	4,610	20,515
<i>Cereals :</i>							
Maize ..	Tons	3,173	366	22	62,541	9,205	250
Others ..	Tons	—	—	1	—	—	98
<i>Miscellaneous :</i>							
Rubber ..	Tons	23	—	3	5,859	—	550
Wattle Bark ..	Tons	50	—	—	1,000	—	—
Ethyl Alcohol ..	Imp.gals.	7,342	80	320	2,670	40	89
Sugar ..	Tons	—	26	30	—	1,690	1,766
TOTAL					39,005,138	42,892,463	41,947,190

EXPORTS OF AGRICULTURAL PRODUCTS TO KENYA AND TANGANYIKA—1958

ARTICLE	UNIT	QUANTITY		VALUE IN £		
		To Kenya	To Tanganyika	TOTAL	To Kenya	To Tanganyika
<i>Oilseeds and Products :</i>						
Cotton Seed ..	Tons	298	—	298	3,768	—
Cotton Seed Cake ..	Tons	852	—	852	11,595	—
Other Oilseed Cakes, Meals and other Oil Residues ..	Tons	320	—	320	6,738	—
Sesame Seed ..	Tons	—	2	2	—	151
Groundnuts ..	Tons	162	20	182	6,752	1,095
Cotton Seed Oil ..	Tons	5,364	1,783	7,147	526,257	163,790
Groundnut Oil ..	Tons	12	10	22	1,340	1,005
Other Vegetable Oils ..	Tons	4	4	8	598	541
<i>Beverage Crops and Tobacco :</i>						
Coffee, not roasted ..	Tons	184	—	184	44,955	—
Tea ..	Tons	161	35	196	49,213	14,967
Unmanufactured tobacco ..	Lb.	3,963,054	321	3,963,375	746,728	16
Cigars, Cheroots and Manufactured Tobacco ..	Lb.	1,693	530	2,223	1,696	538
<i>Spices :</i>						
Chillies ..	Tons	3	2	5	350	145
<i>Beans and Pulses :</i>						
Beans, Peas and Lentils ..	Tons	81	748	829	4,850	24,097
<i>Cereals :</i>						
Millet ..	Tons	13	65	78	214	2,200
Others ..	Tons	12	1	13	461	72
<i>Miscellaneous :</i>						
Rubber ..	Tons	33	—	33	6,501	—
Ethyl Alcohol ..	Imp. gals.	100,770	29,136	129,906	22,797	7,210
Sugar ..	Tons	16,136	6,924	23,060	838,374	359,673
Jaggery ..	Tons	3	2	5	154	69
				TOTAL	2,273,341	575,569
						2,848,910

CROP PRODUCTION, UGANDA
Non-African Production, 1957 and 1958

CROP	ESTIMATED ACREAGE		ESTIMATED PRODUCTION			
			Quantity		Value	
	1957	1958	1957	1958	1957	1958
Coffee (Robusta)	23,618	22,519	<i>Tons</i> 11,010	<i>Tons</i> 12,543	<i>£</i> 2,587,350	<i>£</i> 3,198,465
Coffee (Arabica)	3,103	2,922	857	543	282,810	162,900
Sugar	31,951	33,047	80,774	80,889	3,690,090	3,759,455
Tea	13,061	14,898	3,582	3,691	1,416,180	1,351,649
Sisal	*	6,000	*	480	*	25,000
TOTAL ..	71,733	79,386	—	—	7,976,430	8,497,469

* Not available.

POPULATION AND AVAILABILITY OF LAND

Province, District	Total area Sq. miles	Area of land excluding open water and reserved forests Sq. miles	Cultivated area Acres	Population*	Population density Per sq. mile	Cultivated land per head of population Acres	Estimated available land per head of population Acres	Ratio of available land to cultivated land
<i>Buyanda—</i>								
Mengo ..	14,589	10,047	1,193,398	899,596	90	1.33	7.15	5.38
Masaka ..	8,122	3,969	351,989	317,688	80	1.11	8.00	7.21
Mubende ..	2,679	2,581	127,165	84,878	33	1.50	19.46	12.97
TOTAL ..	25,390	16,597	1,672,552	1,302,162	78	1.28	8.16	6.38
<i>Eastern—</i>								
Busoga ..	6,876	3,219	820,432	505,998	149	1.62	4.07	2.51
Bugisu and Mbale Township ..	1,597	1,166	434,956	266,559	229	1.63	2.80	1.72
Bukedi ..	1,770	1,701	600,624	333,391	196	1.80	3.27	1.82
Teso ..	4,990	4,533	794,853	402,564	89	1.97	7.21	3.66
TOTAL ..	15,233	10,619	2,650,865	1,508,512	140	1.76	4.51	2.56
<i>Northern—</i>								
Acholi ..	11,176	10,703	309,946	215,655	20	1.44	31.76	22.06
Lango ..	4,898	4,519	583,573	265,890	59	2.19	10.88	4.97
Karamoja ..	11,472	10,336	119,471	125,567	12	0.95	52.68	55.45
West Nile/Madi ..	6,061	5,294	528,673	336,036	63	1.57	10.08	6.42
TOTAL ..	33,607	30,852	1,541,663	943,175	31	1.63	20.93	12.84
<i>Western—</i>								
Bunyoro ..	6,011	4,198	177,917	108,380	26	1.64	24.79	15.12
Toro ..	5,380	4,319	190,309	258,873	60	0.74	10.68	14.43
Ankole ..	6,320	5,621	358,547	400,924	71	0.89	8.97	10.08
Kigezi ..	2,040	1,757	450,121	395,529	225	1.14	2.84	2.49
TOTAL ..	19,751	15,895	1,176,894	1,163,706	73	1.01	8.74	8.65
PROTECTORATE TOTAL ..	93,981	73,963	7,041,974	4,917,555	66	1.43	9.63	6.73

* 1948 Census figure.

PRINCIPAL AGRICULTURAL LEGISLATION

Subject	Ordinance Number	Legal Notice Number	Short Title	Objects
Coffee	—	16	Bugisu Coffee Ordinance, 1955	Variation in the constitution of the Bugisu Coffee Board.
..	—	40	Coffee (Export Duty) Ordinance, 1955	To lay down procedure for railing estate coffee.
..	—	189	Coffee Industry Ordinance, 1953	To increase hullery processing quotas.
..	—	113	Coffee Industry Ordinance, 1953	To increase the fees for coffee processing licences and for buyers' licences.
Cotton	—	261	Coffee Industry Ordinance, 1953	Establishment of coffee markets and limitation of licences.
..	—	115	Cotton Ordinance, 1952	Fixation of maximum charges for ginning and baling.
..	—	7	Cotton Ordinance, 1952	To limit the import or export of cotton seed, cotton plants or raw cotton into or from the South Teso segregated areas.
Plant Protection	—	149	Plant Protection Ordinance	To provide for fumigation of imports suspected to contain <i>Trogodarma granarium</i> .
Tobacco	—	252, 253	Produce Marketing Ordinance, 1953	Declaration of buying seasons for tobacco leaf.
Produce Marketing	—	107	Produce Marketing Ordinance, 1953	To increase the fee for a controlled produce licence.
Soil Conservation	33	—	Soil Conservation (Non-African Land) Ordinance, 1958	To make provisions for the conservation of soil on non-African lands.
..	—	238	Soil Conservation (Non-African Land) Ordinance, 1958	To establish a conservation committee in Busoga.
..	—	226	Soil Conservation (Non-African Land) Ordinance, 1958	To lay down procedure for appealing against conservation orders.
Prevention of Famine	—	303	Agricultural (Amendment) Bye-Law, 1958..	To make provision for the putting aside of finger millet as a reserve against famine.

DEPARTMENT OF AGRICULTURE—STAFF POSTINGS AS AT 31ST DECEMBER, 1958

A. Administrative

Title	Name	Station	Remarks
<i>Director of Agriculture</i> ..	J. G. M. King, O.B.E.	Entebbe.	
<i>Deputy Director of Agriculture</i> ..	J. T. Moon..	Entebbe.	
<i>Deputy Director of Agriculture (Crop Industries)</i> ..	D. R. N. Brown	—	Proceeded on leave 15-12-58.
<i>Assistant Director of Agriculture</i> ..	G. D. Badger	Entebbe.	
<i>Administrative Secretary</i> ..	E. B. Buckingham	Entebbe.	
<i>Establishment Officer</i> ..	A. S. Bleasdale	—	Proceeded on leave 21-12-58.
<i>Economic and Marketing Assistant</i> ..	T. Boothroyd	Entebbe.	
<i>Bursars, Farm Institutes</i> ..	J. S. Duncan	Bukalasa	
	G. H. G. Stacey	Arapai.	
	Lt.-Col. D. Macdonald	Kawanda.	
<i>Executive Officer</i> ..	J. E. de Souza	Entebbe.	
<i>Office Superintendent</i> ..	J. F. T. S. R. Lobo, M.B.E.	—	Proceeded on leave 15-12-58.
<i>Accountant</i> ..	Miss D. M. G. Bunge	Entebbe.	
<i>Personal Secretaries, Grade II</i> ..	Mrs. C. Innes	Namalere.	
	Miss M. S. Ross	Kawanda	Arrived 25-10-58.
	Miss B. V. Nicholson	Kampala.	

B. Field Division

Title	Name	Station	Remarks
<i>Assistant Directors of Agriculture (Field)</i> ..	D. F. Stewart	Jinja	Provincial Agricultural Officer, Eastern Province.
<i>Chief Agricultural Development Officer</i> ..	Major W. H. Edwards, M.C.	Kampala	Chief Agricultural Officer, Buganda.
<i>Principals, Major Farm Institutes</i> ..	A. D. Llewellyn-Jones	Namalece.	
	O. S. Swainson	Bukalasa.	
	J. M. Arthurs	Arapai.	
<i>Senior Agricultural Officers and Agricultural Officers</i> ..	G. W. Anderson	Fort Portal	Provincial Agricultural Officer, Western Province.
	A. E. B. Williams	Gulu	Provincial Agricultural Officer, Northern Province.
	E. S. T. Marshall	Fort Portal.	
	D. C. Todd	Mbale.	
	R. G. Hampson	Kampala.	
	J. R. Low	Soroti.	
	R. B. Johnston	Ngetta.	
	R. J. Harvie	Mbarara.	
	A. G. Ouseley-Smith	Arua.	
	A. R. Dunbar	Entebbe.	
	C. R. Horrell	Serere.	
	W. Hadlow	Gulu.	
	T. E. F. Weavind	Bukalasa.	
	R. E. H. Atkinson	Mpigi.	
	A. D. R. Kerr	Mbale.	
	A. R. Humphreys	—	Proceeded on leave 18-8-58.
	K. M. L. Matthews	—	Proceeded on leave 28-8-58.
	J. C. Phillips	Jinja.	
	L. S. Todd	Soroti.	
	O. S. Barr	Arapai.	
	A. S. Macdonald	Mukono.	
	J. B. Warren	Jinja.	
	T. H. Stobbs	Kawanda.	
	C. D. Watkins	Fort Portal.	
	G. S. Scott	Moroto.	
	G. W. R. Onaba	Kampala	Arrived 28-7-58.
	G. K. Reakes-Williams	Bukalasa	Arrived 4-12-58.
<i>Agricultural Engineer</i> ..	D. Innes	Namalece.	
<i>Agricultural Officers (Economist)</i> ..	E. H. Jones	Entebbe.	
	D. O. Ocheng	Tororo	Arrived 12-9-58.

B. Field Division—continued

Title	Name	Station	Remarks
<i>Agricultural Officers (Uganda)</i>	..		
<i>Senior Field Officers and Field Officers</i>	..		
	G. L. Kigundu	Kampala.	
	H. R. Berunga, M.B.E.	Mubende.	
	L. B. Ellis	Namalere.	
	G. A. Fennell	Serere.	
	L. Green	Kampala.	
	A. G. K. Will	Mbale.	
	A. L. Stephens, M.B.E.	Serere.	
	J. G. Wilson	Moroto.	
	J. L. McCumiskey	Bukalasa.	
	W. P. Beattie	Mbale	
	J. G. Smithson	Namalere.	
	A. J. S. Armitage	Namalere.	
	H. D. C. Tarlton	Kigumba.	
	J. B. Mott	Gulu.	
	V. V. Millet	—	
	D. C. Collin	Kabale.	
	J. K. Mintowt-Czyz	Kituza.	
	I. Tilley	Masaka.	
	M. F. Merchant	Bukalasa.	
	P. W. Taylor	Jinja.	
	J. H. Miller	—	
	I. H. Woodruffe	—	
	Major T. F. Ellis	—	
	J. M. Trathen	—	
	N. R. E. Travers	Arapai.	
	W. A. Kneale	Kabale.	
	S. E. Mabey	—	
	K. M. I. Popiel, M.B.E.	Kampala.	
	H. B. Miller	Nyakatonzi.	
	R. E. Oliver	Masaka.	
	C. F. E. Wadey	Mpigi.	
	F. Bateman	Ngetta.	
	J. R. Mayne	Kawanda.	
	J. R. Dorrell	Soroti.	
	I. D. Hamilton	Mukono.	
			Seconded to Bugisu Coffee Board.
			Proceeded on leave 31-7-58.
			Proceeded on leave 26-9-58.
			Proceeded on leave 7-10-58.
			Proceeded on leave 1-12-58.
			Proceeded on leave 18-12-58.
			Proceeded on leave 6-11-58.

B. Field Division---continued

Title	Name	Station	Remarks
<i>Senior Field Officer and Field Officers</i> ---continued.	P. W. Hay ..	Kitgum ..	Arrived 1-2-58.
	I. D. Gedye ..	Mbarara ..	Arrived 8-10-58.
	R. J. Crichton ..	Serere ..	Arrived 13 10 58.
	F. P. Smyth ..	Jinja ..	Arrived 13-10-58.
	R. J. Leach, ..	Moroto ..	Arrived 28-10-58.
	G. K. Petrie ..	Gulu ..	Arrived 12 12 58.
	M. H. F. Low ..	Kigumba ..	Arrived 26-12-58.
	J. D. Sorrie ..	Karamoja.	
	R. C. Payne ..	Karamoja.	
	Major C. M. Lamb ..	Karamoja.	

C. Research Division

<i>Chief Research Officer</i> <i>Senior Entomologist and Entomologists</i>	E. M. Chenery ..	Kawanda.	
	J. Bowden ..	Kawanda.	
	W. R. Ingram ..	Serere.	Proceeded on leave 10-10-58.
<i>Senior Chemist and Chemists</i>	J. C. Davies ..	— ..	
	D. N. McNutt ..	Kawanda.	Arrived 4-10-58.
	D. Stephens ..	Kawanda.	
<i>Soil Survey Officers</i>	B. Butters ..	Kawanda.	
	J. F. Harrop ..	Kawanda.	
<i>Senior Botanist and Botanists</i>	S. A. Radwanski ..	Kawanda.	Arrived 24 2-58.
	D. G. Thomas ..	Kawanda.	Arrived 6-8-58.
	I. Langdale-Brown ..	Kawanda.	
<i>Senior Agronomist and Agronomists</i>	D. J. Butt ..	Kawanda ..	
	D. J. Parsons, M.C. ..	Kawanda.	
	A. D. H. Joblin ..	Serere.	Arrived 30-5-58.
<i>Officer-in-Charge, Serere</i> <i>Officer-in-Charge, Coffee Research Unit</i> <i>Curator, Botanic Gardens</i> <i>Laboratory Technologist</i> <i>Librarian</i> <i>Mechanics</i>	G. E. D. Tiley ..	Kawanda ..	
	W. E. Mills ..	Serere.	
	J. F. Archibald ..	Kawanda.	
	C. Sandison ..	Entebbe.	
	E. W. Hughes ..	Kawanda.	
	Miss P. M. Fiddes ..	Kawanda.	
	T. R. Jones ..	Kawanda.	
	G. J. Webb ..	Kawanda.	

<i>Name</i>	<i>Station</i>	<i>Name</i>	<i>Station</i>	<i>Name</i>	<i>Station</i>
Z. H. Kwehila	Seconded.	Y. Yigga	Toro.	S. K. Sengendo	U.K. Scholarship.
S. M. B. Mutagwanya	Mukono.	O. L. Lalobo	Acholi.	J. C. Sozi	U.K. Scholarship.
P. M. Sali	Mityana.	Y. E. Onaba	Teso.	I. L. Lubwa	West Nile.
T. K. Otim	Seconded.	E. Kyagaba	Bukalasa.	N. O. Z. Sakio	Teso.
J. M. Sekimpe	Kampala.	E. Rwakakara	Bunyoro.	I. M. Byagagaire	U.K. Scholarship.
S. M. N. Kijambu	Bowa.	J. M. Luzinda	Busoga.	E. B. Galukande	U.K. Scholarship.
T. C. Wanyoto	Seconded.	H. G. N. Semambo	Mukono.	T. R. Odhiambo	Kawanda.
R. K. Kachope	Hoima.	P. S. Bulera	Mpigi.	R. A. Irigiei	Arapai.
H. D. Mubiru	Kawanda.	Z. K. Sekidde	Busoga.	G. S. K. Byakika	Bukedi.
Y. K. Musisi	Kawanda.	A. G. Kibulo	Busoga.	P. E. K. Sibyetikerwa	Bukalasa.
Z. K. Kateraga	Entebbe.	J. N. Kimoino	Busoga.	G. W. B. Gowa	Lango.
E. B. Sarulo	U.K. Scholarship.	Z. N. Wanyama	Bukedi.	I. J. Oloya	Acholi.
A. K. Mulera	Mityana.	J. A. Wandera	Busoga.	W. O. Lutara	Acholi.
J. B. O. Baguma	Toro.	S. L. Takirambude	Mityana.	J. C. M. Ddungu	Bugisu.
A. A. Kalanzi	Mpigi.	H. W. Mulohi	Seconded.	I. S. Ikara	Teso.
P. Sempa	Bukalasa.	S. B. Kikule	Maaka.	P. Menyira	U.S. Scholarship.
M. S. K. Makumbi	Bowa.	S. K. Mukasa	U.K. Scholarship.	F. X. Lubega	Ankole.
B. M. Kagolo	Mpigi.	D. E. Kawalya	Mubende.	A. M. Mugwanya	Ankole.
I. M. Bulikiro	Bunyoro.	J. S. Musisi	Teso.	J. Obbo	Bukedi.
A. Kanya	Bukalasa.	J. S. Laker	U.K. Scholarship.	F. X. Tebandeke	Bukedi.
F. H. O. M. Zake	Mpigi.	F. J. Luswata	U.K. Scholarship.	D. M. Patel	Kawanda.
Z. K. Banagajja	Toro.	P. K. Kunya	U.K. Scholarship.		

LIST OF PUBLICATIONS BY MEMBERS OF THE DEPARTMENT DURING 1958

AGRONOMY SECTION

PARSONS, D. J., *Problems of Increasing Livestock Productivity in the Intensive Farming Areas of Uganda*. E. Afric. Agric. J., 23, 167 (1958).

The place of cattle in existing systems of Agriculture in Uganda is considered. The profitability of keeping cattle of existing breeds on enclosed farms for beef and milk production on a per acre per annum basis is examined in detail and found to be extremely low. A plea for the introduction of improved stock to Uganda is made, so that progressive farmers may be able to take advantage of the increased economic potential of high producing cattle.

HORRELL, C. R., *Herbage Plants at Serere Experiment Station, Part I*. E. Afric. Agric. J., 24, 41 (1958).

This paper gives a brief account of the grasses studied during the last three years in nursery plots at Serere. A second paper will deal with legumes.

Herbage Plants at Serere Experiment Station, Part II. *ibid.*, 24, 133 (1958).

This is a brief account of the legumes studied during the last three years, in nursery plots at Serere. The main object of the study was to find suitable species for use in leys; at the same time those possibly suitable for green manuring were noted. In a previous paper (Horrell, 1958) which dealt with grass species, the geographical position and environment of Serere Experiment Station were described. The arrangement of this paper follows that of its predecessor, and those legumes which were studied in most detail are again starred in the text.

BOTANY SECTION

JAMESON, J. D., *Protein Content of Subsistence Crops in Uganda*. E. Afric. Agric. J., 24, 67 (1958).

This study was undertaken in connection with the work of Trowell, Davies and Dean on Kwashiorkor. It is an attempt to estimate the protein-calorie ratio of the home diet from agricultural statistics.

(STOREY, H. H.), JAMESON, J. D. and BALDWIN, B. J. T., *East African Work on Breeding Maize Resistant to the Tropical American Rust Puccinia polysora*. Emp. J. exp. Agric. 26, 1 (1958).

Since 1952 *Puccinia polysora* Underw. has become widespread in maize in the tropical areas of East Africa and severe attacks have been shown to reduce yield greatly. Two physiologic races have been recognised, 'EA.1' being today the prevalent race in the field and 'EA.2' being known as yet only in the Muguga glasshouses.

Experimental infection trials in glasshouses at Muguga, Kenya failed to demonstrate resistance in any African maize variety; but among maizes imported from Central America and the Caribbean plants were found that showed the hypersensitive type of resistance. From these, lines were bred that were pure for either of two genes: Rpp₁ conferred high resistance to Race EA.1 but none to EA.2; while Rpp₂ conferred a lesser, but effective, resistance equally to both rust races.

Field breeding at three stations in East Africa was successful in incorporating each of these genes separately in locally adapted maize varieties; and considerable bulks of pure-breeding resistant maizes were expected to become available during 1957 and later years.

BALDWIN, B. J. T., *News from Africa—Uganda*. Comm. Phytopath. News, 4, 29 (1958).

In an attempt to assess the importance of leaf blight on maize, yield, and disease incidence, plots sprayed twice weekly with a commercial preparation (zineb) were compared with similar unsprayed plots. Although the disease was only partially controlled, large increases in yield resulted from the spraying.

There appeared to be only a low level of genetic resistance to leaf blight in K8 and rust-resistance maizes, but genes for a higher level of resistance are available in such types as Muratha.

The effect of ratoon stunting disease on sugar-cane is to reduce the number of tillers produced in the ratoon crops. Heat-treatment of sugar-cane setts for the control of ratoon stunting disease can itself cause a physiological breakdown, causing red coloration at the nodes similar to the disease itself. But, unlike the disease, heat-treatment caused other signs of vascular disorders.

CHEMISTRY SECTION

CHENERY, E. M., *Boron Deficiency in Tea*. Nature, 181, 426 (1958).

For the first time in the history of the tea bush boron deficiency symptoms have been observed and described. They consist of dead growing points, closed internodes, crinkled leaves, brown spotted flush and the occurrence of cork on the underside of the petioles and main veins.

(ROBINSON, J. B. D.) and CHENERY, E. M., *Magnesium Deficiency in Coffee with Special Reference to Mulching*. Emp. J. exp. Agric., 26, 259 (1958).

The magnesium-deficiency syndromes for Arabica and Robusta coffee are described in detail. Distribution of magnesium and potassium in twigs of trees treated and not treated with grass mulch or coffee husk are presented. The critical level of magnesium below which the syndrome is likely to occur and the leaves drop prematurely is about 0.20 per cent although many cases are cited where the magnesium content was below 0.10 per cent. The critical ratio of potassium to magnesium in leaves is about 10 to 1.

Mulching treatments have a strong tendency to induce magnesium deficiency by supplying an excess of antagonizing potassium. Iron chlorosis is frequently associated with magnesium deficiency for the same reason. Magnesium levels are maintained, or even raised, in the cherry, despite deficiency in the leaves, thus tending to aggravate the gross deficiency in the tree. Magnesium deficiency occurs chiefly in older leaves in whose axils flowers or cherries are developing. Remedial measures are suggested.

BUTTERS, B., and CHENERY, E. M., *Rapid Methods for the Determination of Sulphur in Plants and Soils*. Analyst (in the press).

A statistical study is described of the use of turbidimetric measurements of sulphate as barium sulphate. Procedures are then given for the determination of total sulphur in soils and plants using extremely pure magnesium nitrate to oxidise the organic matter. The techniques are eminently suitable for large batches of samples and should have general application in biological and geochemical analysis.

OLLIER, C. D., *A two cycle theory of tropical pedology*. J. Soil Sci. (in the press).

Evidence from geomorphology and mineralogy is presented which indicates that many tropical soils in Uganda are formed on pre-weathered rock. The first cycle of weathering took place before the formation of the African surface, probably in mid-tertiary times or earlier. Further weathering and pedological change is taking place in the present cycle.

A variety of profiles are explained on this basis and some catenary relationships are also described. A number of previous ideas are discussed to indicate how the present theory differs from earlier ones.

OLLIER, C. D. and HARROP, J. F., *A Study of the Caves of Mount Elgon*. Uganda Journal, September (1958).

Four groups of caves are described and their formation explained. Soft volcanic ash sandwiched between hard agglomerate is leached and disintegrated by horizontally percolating water. The process is similar to that which gives rise to limestone caves but with initiation by solution of sodium sulphate instead of calcium bicarbonate.

RADWANSKI, S. A. and OLLIER, C. D., *A Study of an East African Catena*. J. Soil Sci. (In the press).

The Buwekula Catena occupies a tor landscape which was formed in two stages as in Linton's two cycle theory. Weathering within the profiles under present conditions has been traced from the proportions of minerals. Foldspar and magnetite show weathering trends and among non-opaque heavy minerals there is an order of weatherability in the series biotite, muscovite and epidote.

The soil sequence from summit to valley is as follows. Buwekula Shallow occurs on the upper slopes just below the rocky summits and is a comparatively youthful soil still containing some unweathered but weatherable minerals. Buwekula Red is found on the upper and middle sections of pediments and is a deeply and thoroughly weathered soil the parent material of which has sustained more than one cycle of weathering. Buwekula Brown is a topohydric variant of Buwekula Red and occurs on the lower sections of the pediments. This series is closely related to its red associate in respect of parent material and profile morphology but its present evolution is controlled by the topographic site and resulting drainage. The two alluvial series (Buwekula Yellow-Brown and Buwekula Grey) are derived from weathering and erosion products of the deeply weathered upland associates. They are of different ages and show a recent evolutionary development.

Mineralogical and geomorphic evidence indicates that a great deal of weathering took place before the present land surface evolved and that the upland soils, particularly Buwekula Red and Brown, are being formed to a large extent on pre-weathered material. Since the formation of the present land surface further weathering, accompanied by other pedological processes, has given rise to the present soil profiles which appear to be in equilibrium with their present environment so that the development of soil horizons is keeping pace with all the processes responsible for their removal.

Buwekula Red and Brown show slight contemporary lateritization reflected in the formation of a mottled and partially ferruginized material and of iron concretions. There is also evidence for movement of iron both through the profile and down the hillslope and for the formation of iron concretions in the mottled subsoils and their dissolution in the topsoils.

The distribution of individual soil series of this catena has a considerable influence on the land-use pattern of the area. Despite the ample and favourably distributed rainfall the Buwekula soils are not as productive agriculturally as some other soils in Uganda under similar climate. The main reasons for this are their high acidity associated with extremely low percentages of base saturation and their liability to accelerated erosion. Some suggestions are made regarding the choice of agricultural crops and manurial and cultivation methods.

ENTOMOLOGY SECTION

DAVIES, J. C., *Aluminium Phosphide for Bulk Grain Fumigation in Uganda*. E. Afric. Agric. J., **24**, 103 (1958).

An account of a successful fumigation of a large grain-store plant using aluminium phosphide. Very satisfactory kills were achieved, and provided adequate precautions taken, this method may well have a considerable future in bulk grain fumigation.

(COAKER, T. H.) and DAVIES, J. C., *Palatability of Maize under Storage in Uganda*. *ibid.* **24**, 57 (1958).

Grain deterioration after long storage is a major factor contributing to poor palatability, over and above insect infestation, providing the infestation is not severe and does not cause secondary deterioration of the grain.

The African tasters used in the experiments described could distinguish between old and new maize, other factors being equal, but this distinction could not be made if the maize was presented as roller-milled flour as readily as with hammer-milled maize.

WHALLEY, P. E. S., *The use of Dieldrin for control of Carpenter Bees (Xylocopa spp.)*. E. Afric. Agric. J., **24**, 16 (1958)

The effect of three concentrations of Dieldrin W.P. on *Xylocopa* spp. is given. A one per cent concentration was found to give protection for at least ten months.

An account of the Weevil Larvae bred from the Banana Plant in Uganda, with a description of the Larva of Temnoschoita nigroplagiata (Qued) (Col., Cure.). Bull. Ent. Res. **49**, 421 (1958).

An account of the weevils associated with bananas in Uganda is given. The two weevils which cause most damage to the living stems are *Cosmopolites sordidus* (Germ) and *Temnoschoita nigroplagiata* Qued. The former has been known for many years, but the latter has only recently been proven to attack living stems. The distribution of the genera *Cosmopolites* and *Temnoschoita* in Uganda is given and it is noted that where the former is now common the latter is not so, and conversely. A detailed description of the larva of *Trigroplagiata*, and the characters separating larvae and pupae of this species from those of *C. sordidus*, are also given.

BOWDEN, J., and INGRAM, W. R., *A Revised Interpretation of the Causes of Crop Losses of Cotton in Uganda*. Nature, **182**, 1750 (1958).

Data are presented that show a high degree of spiny bollworm (*Earias* spp.) control using D.D.T. It is suggested, in view of lack of correlation of any form of damage by *Lygus*, with subsequent increases in yield, against highly significant correlations of all measures of bollworm infestation, that *Earias* is probably the more important pest in drier cotton areas of Uganda.

BOWDEN, J. and INGRAM, W. R., *Spraying Trials on Peasant Cotton in Uganda in 1957*. Emp. Cott. Gr. Rev., 35, 239 (1958).

Significant increases of yield have been shown to result from spraying S.47 cotton in Uganda, though economic returns accrue only from early (May to mid-June) sown cotton. It is also probable that economic returns result from spraying B.P.52 cotton in Bunyoro, although the results obtained in this area are not so conclusive as those obtained from the S.47 zones.

Data obtained from unsprayed plots have confirmed that a linear relationship exists between planting date and yield, and that later plantings progressively reduce yield.

INGRAM, W. R., *The Lepidopterous Stalk Borers Associated with Gramineae in Uganda*. Bull. Ent. Res., 49, 367 (1958).

A Protectorate-wide survey carried out in 1954-1956 showed that the commonest species of stalk borers were the Noctuids *Busseola fusca* (Fuller) *B. segeta* Bowden, *Sesamia calamistis* Hmpn. and *S. peophaga*, Tams and Bowden and the Pyralid *Chilo zonellus* (Swint.) and *Eldana saccharina* Wlk. All cultivated Gramineae are attacked to some extent but only sorghum and maize seriously. All known borers and host plants are listed.

B. fusca is widely distributed but not abundant in areas of intense cultivation and at the higher altitudes. Dry season carry-over is by a larval resting-stage, particularly in crop residues. *B. segeta* is common in *Panicum maximum* and *Pennisetum purpureum* but rare in cereal crops. *S. calamistis* is not very numerous but occurs in all districts, except Karamoja, where it cannot survive the dry season, and is the major borer in rice and finger millet. *S. peophaga* is widespread but unimportant.

C. zonellus is probably a recent introduction to the country and is common at the lower altitudes—it has not been found above 4,000 feet in the west or 5,000 feet in the north and east—except in Karamoja where it also cannot survive the dry season. It is the most important of all the borers and can cause severe damage in dry years and to out-of-season crops. *E. saccharina* only occurs along the high western border in cereals.

Experiments showed that sorghum is the preferred host to all others but that most thick-stemmed cereals, grasses and sedges are attacked. Brief notes are given on the life histories of the various pests together with a list of all known parasites; *S. calamistis* may be kept under control by parasites.

A brief summary is given of the distribution and importance of all cultivated Gramineae. All the economic species of stalk borer carry-over dead seasons in crop residues and wild *Sorghum* and destruction of these is recommended. Chemical control has not proved worthwhile.

ODHIAMBO, T. R., Drosophilidae (Dipt.) Breeding in Cercopid (Hem.) Spittle Masses. Ent. mon. Mag., 94, 17 (1958).

Leucophenga sp. nr. *sema* Burla was found breeding in the frothy excreta of *Ptyelus flavescens* F. at Kawanda. A few records of other Drosophilidae breeding in Cercopid spittle masses are reviewed.

The Camouflaging Habits of Acanthaspis petax Stal (Hem., Reduviidae) in Uganda. Ent. mon. Mag., 94, 47 (1958).

Laboratory observations on nymphs of *Acanthaspis petax* provided with an empty termite nest for living are reported. The method of capture of prey is described. Ants and termites were readily eaten, and the corpses incorporated into the "camouflage of corpses" covering the body. It was concluded that the camouflage acts as protective covering and also conceals the presence of nymphs from potential prey.

A Note on the Genus Megacoelopsis Poppius (Hemiptera, Miridae), including the description of two new species. Ann. Mag. nat. Hist., 13, 81 (1958).

The genus *Megacoelopsis* Poppius and *M. fasciatus* Poppius are redescribed. Two new species from Uganda are described: *M. nigrescens* found on sweet potato and simsim, and *M. setosus* found on sorghum and *Pseudarthria*. A key is provided to the species of the genus.

Notes on the East African Miridae (Hemiptera), II: A new species of Pleurochilophorus Reuter from Uganda. ibid. 13, 107 (1958).

P. rufolineatus sp.n. was found breeding commonly on pigeon pea. It was also collected on cotton, maize, simsim, wild *Crotalaria*, and *Gynandropsis*.

Key to the species of the genus is given, and a classification of the genus is outlined.

Notes on the East African Miridae (Hemiptera), III: A new species of Hyalopeplus Stal from Uganda. ibid., 13, 183 (1958).

H. longirostris sp.n. is described from specimens collected on *Erythrina excelsa* and cotton. A key to the Ethiopian species of the genus is provided.

Notes on the East African Miridae (Hemiptera), IV: A new species of Pseudosthenarus Poppius from Uganda. ibid., 13, 241 (1958).

The genera *Pseudosthenarus* Poppius and *Sthenarus* Fieber are regarded to be distinct, and reasons are given for this. The *Plagiognathus*-complex of genera is previously discussed. *Pseudosthenarus solani* sp.n. is described from specimens found breeding on *Solanum* sp. ? *incanum* L.

Notes on the East African Miridae (Hemiptera), V: New species of Eurystylus Stal from Uganda. ibid., 13, 257 (1958).

E. risbeci Schouteden is recorded from Uganda for the first time: breeds commonly on castor, and has also been collected on pigeon pea, cotton and sunn-hemp.

Eight new species are described: *E. rubroscutellatus* (at light); *E. antennatus* (on *Mellittia dura*, *Pittosporum abyssinicum*, *Dichapetalum ugandense*, cotton, and pigeon pea); *E. fuscatus* (on *Cupressus*); *E. argenteiceps* (on sorghum, sunn-hemp, *Gynandropsis pentaphylla* and at light); *E. phaeopterus* (at light); *E. varipennis* (at light); *E. immaculatus* (on *Sesbania* sp., *Conyza steudelii*, *Cassia* sp., and cotton); *E. marginatus* (on *Pittosporum abyssinicum*, and at light). A key is provided to the Ethiopian species of the genus.

Notes on the East African Miridae (Hemiptera), VI: A new species of Pilophorus Hahn from Uganda. Ann. Mag. nat. Hist., 13, 326 (1958).

P. pilasus sp. n. is described from specimens caught at light and one from cotton. It is the only species of the genus so far found in the Ethiopian Region.

Notes on the East African Miridae (Hemiptera), VII: New species of Oxacidoris Reuter and Phytocoris Fallen from Uganda. *ibid.* 13, (in the press).

One new species of *Oxacidoris* and five new species of *Phytocoris* are described.

Some observations on the natural history of Acanthaspis petax Stal (Hemiptera: Reduviidae) living in termite mounds in Uganda. *Proc. R. ent. Soc. Lond. (A).* 33, 167 (1958).

A. petax lives in deserted termite mounds. The nymphs have a protective covering consisting of sand particles adhering to the body, and a "coat" consisting of corpses of insect prey, cast skins of previous moultings, and vegetable matter. These, added to their characteristic sudden and rapid movements, effectively camouflage the nymphs from their enemies and prey alike. An account of the pattern of daily activity is given. Nymphs are diurnal while adults are nocturnal. Nymphs were observed to feed on ants and termites; they can remain several days without feeding.

An association between mites and carpenter-bees. *Uganda J.*, 22, 164 (1958).

Mites of the genus *Dinogamasus* were found to be carried in an abdominal pouch of the females of carpenter-bees of the genus *Xylocopa*. Problems of the origin of this habit are briefly reviewed.

An account of parental care in Rhinocoris albopilosus Signoret (Hemiptera-Heteroptera: Reduviidae), with notes on its life history. *Proc. R. ent. Soc. Lond. (A).* (in the press).

1. Parental care and the life history of *Rhinocoris albopilosus* was studied in Uganda, both in the laboratory and in the field.

2. After mating, the male continues to ride on the back of the female until the latter lays her eggs. The female then leaves the vicinity but the male remains behind to guard the eggmass ("brooding"). He remains with the eggmass until a few days after hatching has started.

3. Oviposition period lasts from four to 12 days. All the batches laid during this period are added to the first eggmass, the females around the area also add their eggs to this eggmass.

4. The young nymphs readily accepted thrips for food; from the fourth instar, however, the nymphs showed a definite preference for larger insects. Brooding males did not go in search of food.

5. Two egg-parasites were bred at Kawanda; *Hadronotus antestiae* Dodd and *H. sp. nov. hiberus* Nixon (Scelionidae).

6. It is suggested that the brooding habit helps in keeping away egg-parasites.

